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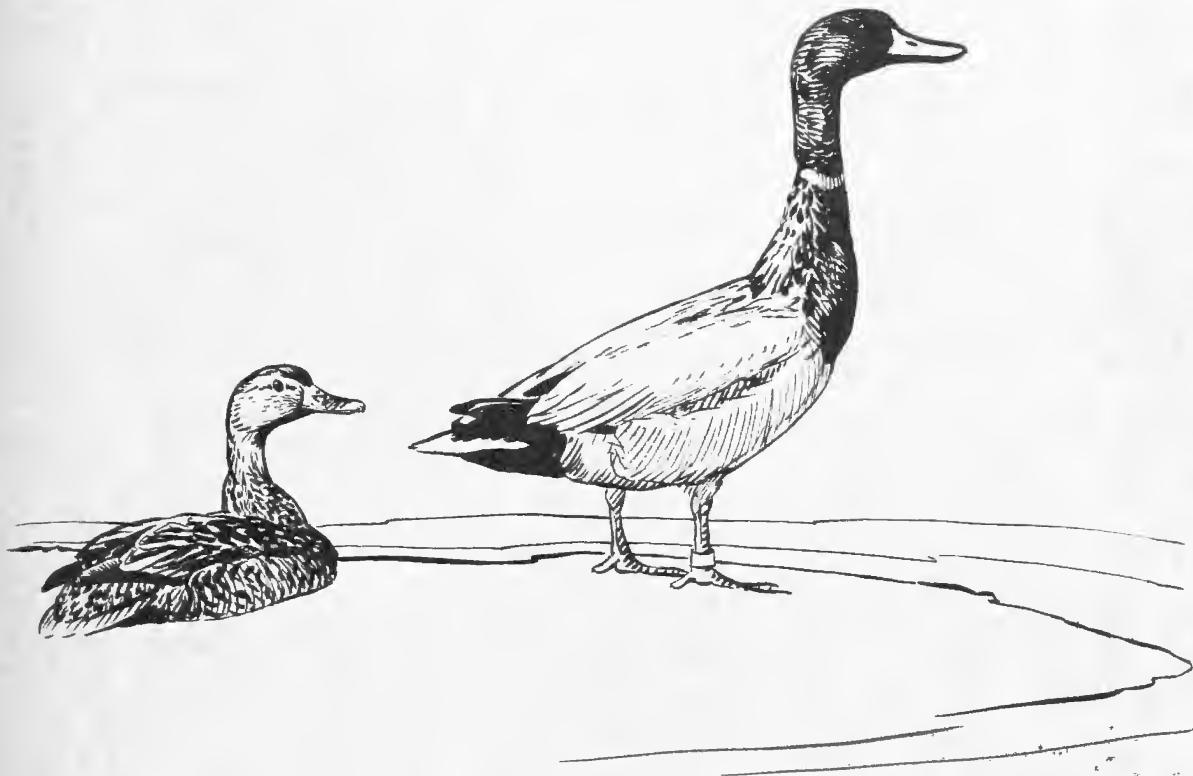
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# WATERFOWL STATUS REPORT

## 1964

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UNITED STATES DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE  
Special Scientific Report--Wildlife No. 86

Created by act of Congress in 1849, the Department of the Interior is responsible for a wide variety of programs concerned with the management, conservation, and wise development of America's natural resources. For this reason it is often described as a department of natural resources.

Through a score of bureaus and offices the Department is responsible for the use and management of millions of acres of federally owned lands; administers mining and mineral leasing on a sizable area of additional lands; irrigates reclaimed lands in the West; manages giant hydroelectric power systems; administers grazing and forestry programs on federally owned range and commercial forest lands; protects fish and wildlife resources; provides for conservation and development of outdoor recreation opportunities on a nationwide scale; conserves hundreds of vital scenic, historic, and park areas; conducts geologic research and surveys; encourages mineral exploration and conducts mineral research; promotes mine safety; conducts saline water research; administers oil import programs; operates helium plants and the Alaska Railroad; is responsible for the welfare of many thousands of people in the territories of the United States; and exercises trusteeship for the well-being of additional hundreds of thousands of Indians, Aleuts, and Eskimos, as well as being charged with resource management of millions of acres of Indian-owned lands.

In its assigned function as the Nation's principal natural resource agency, the Department of the Interior bears a special obligation to assure that our expendable resources are conserved, that renewable resources are managed to produce optimum yields, and that all resources contribute their full measure to the progress, prosperity, and security of America, now and in the future.

UNITED STATES DEPARTMENT OF THE INTERIOR, STEWART L. UDALL, SECRETARY  
Frank P. Briggs, Assistant Secretary for Fish and Wildlife  
Fish and Wildlife Service, Clarence F. Pautzke, Commissioner  
Bureau of Sport Fisheries and Wildlife, John S. Gottschalk, Director

# WATERFOWL STATUS REPORT 1964

Compiled by

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in collaboration with  
DIVISION OF WILDLIFE RESEARCH



Bureau of Sport Fisheries and Wildlife  
Special Scientific Report—Wildlife No. 86  
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# WATERFOWL STATUS REPORT 1964

The 1964 waterfowl hunting regulations were developed from four broad, closely related categories of information as herein reported. The groups of data are organized by flyways, from Pacific to Atlantic, with appendixes of tables to correspond.

Credit has been given to each individual or organization that submitted a re-

port. Although many of the narrative statements have been briefed, and a few tables deleted or shortened if they contained data submitted previously or in another form, the essential information from each report has been retained to the greatest extent possible.

## WINTER SURVEY

Data supplied by J. D. Smith  
Bureau of Sport Fisheries and Wildlife

The annual winter survey covered all major wintering areas of the United States and Mexico. In Mexico the Bureau of Sport Fisheries and Wildlife organized and conducted the survey. In the contiguous United States, the Bureau organized the survey, but much of the field work was done by personnel of State conservation departments. The U. S. Department of Defense and the U. S. Coast Guard supplied aircraft for aerial counts in many areas.

The objectives of the annual winter survey are primarily to determine the distribution of waterfowl on the wintering grounds and to detect gross changes in the

condition of winter habitat as measured by the comparative utilization of that habitat by waterfowl.

Only for a few species such as the swans, geese, redheads, canvasbacks, and black ducks are the winter survey results used to help measure annual population status. The status for most waterfowl is determined from spring and summer surveys on the nesting grounds; those surveys provide the best information for the setting of annual hunting regulations.

The winter survey is not an accurate measure of annual waterfowl population changes because there are differences

each year in visibility, in observers, in weather, and in a host of other factors. However, the winter survey data have great value for determining the use made of various wintering areas and the change in waterfowl distribution from year to

year in response to changing weather and habitat conditions.

All data referring to the 1964 winter survey are based on observed birds -- appendix tables A-1 to A-17.

## BREEDING GROUND SURVEYS

The breeding ground surveys are co-operative. The Bureau of Sport Fisheries and Wildlife, the Canadian Wildlife Service, the Provincial game branches, Ducks Unlimited, and the State conservation departments combine their equipment and manpower to conduct the necessary surveys throughout the vast extent of the waterfowl breeding range.

Flyway biologists of the Bureau survey most of the important waterfowl breeding areas in Alaska, Canada, North Dakota, South Dakota, and Minnesota from the air. Statistically designed sampling techniques and similar methods of collecting and analyzing data are used throughout these areas. In addition, many of the Northern States conduct breeding ground surveys which may vary somewhat but are generally similar in methods to those employed in the Dakotas, Canada, and Alaska.

The aerial crews count the birds on somewhat less than 1 percent of the total breeding area. This is sufficient coverage to reduce sampling error to less than 20 percent of the average population density in most survey areas, and to much less than 20 percent when considering the breeding range as a whole.

The results of the breeding ground surveys are presented as indexes. When conducting aerial surveys of breeding birds or of broods, not all birds present are seen by the aerial crews. Methods are being developed to measure the proportion of birds present but not visible from the air. These studies have not progressed to the point where visibility factors can be determined throughout the breeding range. Therefore, the indexes in this report are based on birds actually seen, and it is emphasized that they do

not constitute estimates of the total numbers present.

Surveys are conducted for the purpose of estimating the relative size of the fall flight from each of the breeding areas. Two coverages are required to obtain the necessary information: during May and June to measure distribution and relative size of the breeding population, and during July to forecast the relative number of young that will be produced. It is necessary to make an estimate of the number of young that will be produced, since only a part of the eggs will have hatched before the shooting regulations are established. The production survey, therefore, is a measure of the number of broods on the water at the time of the survey plus a measure of weather, water, and other conditions that affect or reflect production success following the survey period.

Results of the May breeding population survey and of the later production survey, which form the basis for forecasts of changes in the relative size of the fall flight, are contained in tables B-1 to B-70.

## ALASKA

Data supplied by Henry A. Hansen and James G. King, Jr., Bureau of Sport Fisheries and Wildlife

Based on the past 8 years of air and ground surveys, the stratification of Alaska's waterfowl habitat for sampling purposes was changed in 1964 to comprise two strata based primarily on like ecological characteristics. Stratum 1 encompasses all the treeless, coastal

tundra from the Alaska Peninsula north through the Noatak and Selawik valleys; stratum 2 contains the spruce-muskeg habitat of the interior from the Innoko and Koyukuk River valleys east to the Canadian border. Stratum 3 designates the mountain valleys of southern Yukon and northwestern British Columbia.

Data from previous years have been recalculated within the new strata so that figures are comparable for 1963 and 1964.

### Weather and habitat conditions

The weather book for Alaska was completely rewritten in May 1964. Phenologically, conditions were at least a month late, from the southeastern coastal areas to the Bering Sea and Arctic coasts and throughout the interior.

Waterfowl movements and behavior were directly, and adversely, affected by the following conditions: The spring thaw began in a routine manner in April. The winter's sparse snowfall in the low river valleys melted rapidly and created runoff ponds. Pintails, mallards, and white-fronted and Canada geese started to arrive on schedule in the Fairbanks area by April 20-22. By May 1 the temperatures had dropped, and soon all the open ponds froze. On the night of May 8, for example, the temperature dropped to  $-1^{\circ}$  in contrast to  $72^{\circ}$  on the same date in 1963. Even the day-time temperature seldom reached much above freezing until the middle of the month. The Tanana River ice pool was won on May 20, the latest date in its long history. When the Tanana, the first of the major rivers to break, finally opened there was still over 6 feet of solid ice in the Black River above Fort Yukon. It was June 3 before the ice finally cleared the river at Fort Yukon. Some of the larger lakes and most of the smaller permanent ponds had some open water around their edges by the first of June, but they all contained ice. All lakes, large enough, had ice solid enough to land on skis. The mouth of the Yukon River was still frozen on June 10.

When the cold weather finally broke by the first of June, temperatures soared.

The heavy snow pack in the mountains and near the coast melted rapidly, flooding many of the lower nesting grounds. On June 5, black brant and cackling goose nesting grounds were a solid sheet of water from snow melt. The Bering Sea coast was still frozen, which prevented this water from running off through its normal channels. Large flocks of brant and geese, which would ordinarily be incubating by this date, were flying aimlessly about the outer delta. There were many snow geese still passing north up the Bering Sea coast enroute to Siberia, exceptionally late for them. Very few whistling swans were nesting on the Yukon-Kuskokwim Delta by June 5. Normally, most of them would already be well into incubation.

With the severe temperatures of early May, most of the pintails and mallards which had arrived on schedule departed from the interior. Of those that remained, many became emaciated, and some mortality was reported. This physiological setback will undoubtedly have an adverse effect on the productivity of at least the early nesting species.

### Breeding population index

There was no significant change in the total duck breeding population or in any of the numerically important species with the exception of mallards, which were down about 20 percent. There was a definite shifting of the population from the interior to the coastal habitat; the interior was down by 15 percent and the coastal was up by an equal percentage. Apparently, when the ducks pulled back from the early May freezeup they moved to the southern coast, and many followed the ice line up through Bristol Bay and the Yukon-Kuskokwim Delta without returning to the interior. The large percentage fluctuation for several of the species counted in small numbers is not meaningful, for instance, green-winged teal and shoveler (tables B-1 to B-3). Our system of expanding these small samples into an accurate total population is not adequate for the task.

Of particular significance was the disposition of the early nesting species. In a normal year by June 7 or 8, pintails are usually counted as single males or small flocks of deserter males. Seldom are many paired pintails observed that late. As late as June 10 when the survey was terminated this year, pintails were observed not only as pairs but in sizable flocks of mixed sexes. This seemed to indicate idle hens which had either deserted an early attempt or had not attempted to nest in the first place. The late-nesting scaup and scoters were also rafted in flocks of mixed sexes, but there was still time for them to make a recovery unless their physiology was also derailed by the late spring.

### Production indexes

As predicted at the time of the waterfowl breeding population survey, the production of all species was down from 1963. All the dabblers and canvasback--the early nesters--were particularly hard hit.

The overall trend on the two major study areas of the interior was almost identical. At Tetlin, 61 percent fewer broods were counted than in 1963. On the Yukon Flats, 58 percent fewer broods were counted. Canvasback were down 86 and 79 percent. Pintail were down 64 and 66 percent. Widgeon were down 76 and 53 percent. Mallards were down 91 percent at Tetlin but only 8 percent on the Yukon Flats. Conversely, green-winged teal were down only 30 percent at Tetlin but 68 percent on the Yukon Flats. When the first brood count terminated on July 24 it was still too early for an accurate assessment of the scaup trend. The first broods were just starting to appear.

The hatch for all species in all areas of Alaska was much later than normal. In 1963 at Tetlin, 44 percent of all broods counted were age class I, 35 percent age class II, and 21 percent age class III. On the same dates in 1964, 78 percent were age class I, 22 percent age were class II, and no broods of age class III were ob-

served. The comparison on the Yukon Flats was very similar.

In contrast to the late hatch and few broods, the average brood size was unaccountably and exceptionally large. In 1963 at Tetlin, 126 broods averaged 7.3, and in 1964, 49 broods average 7.1. On the Yukon Flats in 1963, 160 broods averaged 6.9, and in 1964, 76 broods averaged 6.8. The brood size of all species remained high (table B-4).

The calculated 90 percent loss of brant production in 1963 was verified in July of this year when a sample of 2,064 flightless birds were trapped during the moult. Of this random sample only 3.6 percent were yearlings, whereas 40 percent of a comparable sample were yearlings following the last optimum hatch.

### Special Studies

Data supplied by Peter E. K. Shepherd  
Alaska Department of Fish and Game

### Breeding pair censuses

Ground breeding pair censuses were conducted between June 7 and 13 for the third year in succession at Minto Lakes. Conditions for the ground counts were more varied than in 1962 and 1963 with water levels much lower at the time of the surveys. These counts revealed a population of 40 drakes per square mile, a drop of 31 percent from average. Scaup were about the same, but dabblers were down 30 to 50 percent.

### Nesting and Brook Surveys

There was a 20 to 25 percent decrease in black brant nesting densities. The average clutch size in 1964 was down slightly from the 3-year average, but the average brood size of 3.2 goslings at hatching was about the same.

An aerial brood count of brant suggested that this season's production equaled the average of the past 3 years and was approximately the same as in 1961.

A study was conducted in June on the Copper River Delta as part of a general reconnaissance of earthquake damage to this nesting area. The nesting population of western Canada geese was 25 percent larger than in 1963. The average clutch size of 114 goose nests was 4.3 eggs, 1 egg smaller than the average. Hatching success was 90 percent. A sample of 35 duck nests averaged 7.3 eggs. Hatching success of ducks was 65 percent. Class I broods of Canada geese averaged 4.0 goslings.

With a good late hatch of scaup it is doubtful whether brood production at Minto will exceed one-half of the 1963 crop. The average brood size of 5.5 ducklings was the smallest recorded in the past 10 years. The heaviest decrease was among the dabblers (table B-4).

#### NORTHERN ALBERTA, NORTHEASTERN BRITISH COLUMBIA, NORTHWEST TERRITORIES, AND YUKON

Data supplied by Robert H. Smith and G. Hortin Jensen, Bureau of Sport Fisheries and Wildlife

#### Weather and habitat conditions

A most unusual breakup occurred throughout the survey area. A premature warming began in April attended by snow melt forming open water pools. These conditions precipitated a surge of migrating waterfowl into the area only to be caught by the return of winter and the latest breakup in the memory of old timers. During this time, waterfowl were reported as a hazard to aircraft on the airport runways along the Alaska highway in Yukon, and numerous reports were received of southward-bound migrants. When spring finally broke in mid-May it came with a rush, with ice and open water conditions appearing about normal at the time of the survey, although ice was still running in the lower Mackenzie at the end of the survey period.

Precipitation during the period was very light, occurring mostly as showers of rain and/or snow. Temperatures were about normal except that during the second week of June subfreezing temperatures were reported from all coastal stations and a low of 24° was recorded at Inuvik.

Water levels along the two most southerly transects were low in the west, but were improved toward the east. Sheet water was present in small amounts in the fields, but in general the pond levels were lower than normal. Levels on the Athabasca Delta were ideal in late May, but a rampaging flood on the Peace in progress early in June could alter this situation drastically. The Slave River parklands just north of the delta were literally brimful, with habitat conditions excellent. The Mackenzie Delta was flooded again to the extent that only the highest ridges in the delta proper were above water, while the outer delta was merely an extension of the Beaufort Sea with only an occasional bush showing above the surface. Elsewhere, over most of the area, throughout the muskegs, the precambrian and the tundra water levels were about as they are from year to year with little change noticeable.

#### Breeding population indexes

An overall increase of 28 percent was recorded for the duck population. In general the increases were in the southern half of the survey area, with decreases north of the Arctic Circle with the exception of stratum 7. The most drastic decreases were found along the rim of the Arctic coast, the upland tundra, Mackenzie Delta, and the Old Crow Flats. This might be explained by the extremely late spring and breakup holding the birds in the more southerly areas, but the Mackenzie Delta has had repeated blows during the past several years of high water and floods, beating down production in the local population to the point where even the loons are becoming scarce. There is also the possibility that with water spread under brush and trees less of the population was visible. The outer

delta was a complete washout--the few ducks seen there were roosting on floating ice pans or on logs and trash caught in the tops of the highest willows. A survey was not made of the goose colony on the outer delta because of weather conditions; it is logical to assume that it was drowned out. Also, the colony at the Anderson Delta was a flood casualty.

All species of ducks except canvasback increased or were unchanged from 1963. The figures pertaining to species of slight numerical importance in the area are probably of little significance, as are the coot and goose indexes. The increase in oldsquaws may well reflect the late spring and breakup, holding the birds south of their normal barren ground nesting areas. The increases in shovellers and goldeneyes are unexplained. (Table B-5.)

### Production indexes

Duck production increased substantially in all areas covered except in the Athabasca Delta which was subjected to early high water from the Athabasca and a late flood on the Peace, the combination apparently flooding out most of the nests. The Mackenzie Delta experienced early high water during and shortly after breakup, but this apparently had no effect on the late hatch although the early nesters may have been affected.

Class I brood size averaged 1.2 less ducklings than last year, but class II and III broods were slightly larger than last year. Since class II brood observations were three times as numerous than the other two classes combined, it would appear that there was no significant change in brood size. (Table B-6.)

### SOUTHERN ALBERTA

Data supplied by G. Hortin Jensen and Alva E. Weinrich, Bureau of Sport Fisheries and Wildlife

### Weather and habitat conditions

During the 1963 season there was an indication that the drought gripping the

prairies and parklands of southern Alberta could be breaking. By late fall the seasonal drying trend had nullified our summer expectations. A mild, dry winter prevailed, and the spring outlook for ducks in southern Alberta was not good. Much of the habitat was the poorest observed since the beginning of these surveys.

A general storm from May 1 to 5 hit the parklands and was intensified in the southern prairies. As much as 7 inches of rain in stratum C did much to improve the condition of potholes there. There was less rain in stratum A and northerly through the parklands. This storm served only to improve soil moisture for agriculture, except along the southern border. A wet weather cycle must come to restore good conditions for waterfowl.

No significant precipitation was recorded after May 8. Shower activity was associated with the mountains and across the Milk River ridge, but nothing to raise water levels in the potholes. More than 1 inch of rain fell from Edmonton eastward on the northern parklands during the late survey period. Habitat conditions were good in that area but were dry in the western parklands.

The index for May ponds was 641,000. This was the lowest since inception of these surveys, 27 percent below the average and 24 percent below 1963. When compared with the highest years it is about half the normal complement of water areas (table B-7).

The events previously recorded for stratum C served to raise indexes 14 percent above average and 90 percent above 1963. Very dry conditions of 1963 were reversed. Attrition of water areas is quite severe in the warmer southern areas of the Province, and success of waterfowl breeding populations is more of a gamble than elsewhere in the Province.

Although the water index in stratum C is 14 percent above average and 90 percent above 1963, stratum A is a critical area. The water index is 47 percent below average and 19 percent below 1963. Neither did the gain in water units within the parklands last year persist where the index is 25 percent below average and 39 percent below last season. Much of the increase

in water of 1963 was of poor quality. Seasonal precipitation and runoff were insufficient to maintain the number of potholes through the fall and winter seasons. Even so, this will provide the significant habitat for waterfowl breeding populations this current season.

The net effect of weather patterns during the fall and winter of 1963-64 was to intensify the drought conditions within the waterfowl habitat in southern and central Alberta. The slight improvement during the 1963 season has been lost completely. Dry conditions and resulting loss of runoff from winter storms could have left waterfowl habitat in its poorest condition since surveys were started. Only significant rainfall in the south prevented this situation.

Pothole numbers in July were near normal in stratum C. But in strata A and B and for the Province percentages were 42 to 66 percent below average and comparative data from 1963.

### Breeding Population Indexes

Our early prognosis for a reduced waterfowl population proved to be incorrect. Even with more severe habitat conditions the total waterfowl index for 1964 increased over 1963, dabblers by 13 percent and divers by 5 percent (table B-8).

All species of ducks showed increases from last year with one exception, the pintail. The pintail, an important duck for this area, was 20 percent below 1963 and 51 percent below the long-term average. Mallards were up slightly from 1963 but 10 percent below average. Scaup, the most important diving duck in southern Alberta, showed little change either from 1963 or from average.

The indexes for minor species of dabblers, principally gadwall and baldpate, have held up well during drought conditions. Being later nesters they have the advantage of more stable conditions during nest site selection and incubation.

Presently coots are in the northern parklands where conditions are good. The index for coots increased 45 percent over last year, returning them to their long-time average.

From lone drake ratios it appears that pintails nested earlier than mallards-- 88 percent and 74 percent (table B-9). Aspen began to leaf by mid-survey and leafing was complete at the end of the survey. The first brood was seen in the mid parklands on May 20. These events indicate no delay in the season.

### Waterfowl production indexes

The total brood index decreased from 202,000 to 189,000, 6 percent below 1963 and 19 percent below the average of 234,000. The parklands produced more broods than last year, but the decrease resulted from extreme loss of habitat in southern areas. Brood size of 6.2 was the same as in 1963. (Table B-10.)

During the July survey departure of waterfowl from southern Alberta was evident. Mixed flocks of paired ducks were also scattered over the survey area, most noticeable in the short-grass prairie. They flushed readily, and we judge that they had given up nesting, a condition observed during earlier years of this drought.

The coot brood index was 5 percent below last year and 62 percent below average. Concentrations of as many as 500 coots were observed on larger lakes and potholes.

### Conclusions

The phenology of the season was normal. Class II and III broods predominated in the survey.

The Lynch index is 87 compared with the average index of 115.

Conditions are poor for carry over of potholes for next year. Good runoff is needed for a span of several years to effect a significant upward trend in the number of potholes.

We expect a much below average fall flight from southern and central Alberta. However, it will not differ greatly from 1963.

## WASHINGTON

Data supplied by Robert G. Jeffrey  
Washington Department of Game

### Weather and habitat conditions

The drying trend in the pothole areas, which began in some places in 1958, has continued through the current production period. The potholes in eastern Washington often produce 60 percent or more of the State's duck crop, but in 1964 it is estimated that this production will amount to only 37 percent of the total. Typical of the pothole transects is the one in Douglas County, which in May 1959 covered 84 potholes. In May 1964 there were only 35 water bodies, and by the time of the June count these had declined to 23.

The spring and early summer of 1964 were not conducive to high duck production. In eastern Washington, the spring was cold and dry which greatly retarded nesting cover growth. In western Washington it was cold and wet through the month of June.

### Breeding population indexes

May transect counts in eastern Washington showed the breeding pairs to have increased by 6 percent over 1963. Irrigated areas had 20 percent more pairs, the northeastern highlands were up 10 percent, and even the drying pothole country maintained its adult duck population (up 1 percent).

### Production indexes

At this time it is estimated that duck production will be down 12 percent from 1963 throughout the State (table B-11).

Brood production was down in all areas of the State with the exceptions of irrigation and the northeastern highlands. The calculated percentage of young in the fall population is 54, compared to 60 for last year.

Dabbling ducks will be down 13 percent, while the diving duck portion of the index increased by 2 percent. Of the dabblers,

mallards apparently fared the best, being 5 percent below the 1964 production.

The 1963 Canada goose production index for eastern Washington was 10,200 young plus adults. Goose production has declined 13 percent, making the index 8,900 for 1964. Much of the decline has been credited to dam construction and increased human use of the rivers.

## OREGON

Data supplied by  
Oregon State Game Commission

### Weather and habitat conditions

A heavy winter snowfall and heavy spring rains in southeastern Oregon restored water in many of the waterfowl production areas to nearly normal levels. Precipitation in central and northeastern Oregon, however, was again below normal, and the low production which normally takes place in these areas was further reduced.

### Production indexes

Goose production remained high throughout the breeding range, with exceptionally good success in the Klamath Basin. A shift of breeding birds may have taken place from nearby Klamath Marsh, which is still suffering from drought. The number of young recorded on established transects showed an increase of 27 percent from 1963. Owing to improved water conditions, duck production also increased substantially. Measurements on established transects indicate production to be 15 percent higher than in 1963. (Table B-12.)

Malheur Lake, which was dry throughout the drought period, now contains 20,000 acres of marsh and water with depths ranging to 3 feet. Production estimates for 1964 (not included in the tables) are 34,200 ducklings, up 24 percent from the 1963 production of 27,495.

Production of both ducks and geese on the Klamath Forest Refuge is down from 1963 owing to low water levels and a late

spring. The duck production index declined from 2,490 to 1,150 (table B-13).

An excellent hatch of redheads was recorded on all large marshes, but the number of ruddy duck broods tallied on the transects showed a marked decrease (table B-14).

## CALIFORNIA

Data supplied by J. R. LeDonne,  
F. M. Kozlik, Harry George,  
William Anderson <sup>1/</sup>

### Weather and habitat conditions

Water conditions in northeastern California were nearly normal this year. Some water impoundments and marshes were drier than last year but still provided adequate nesting habitat. Rainfall was below normal, but snow pack at higher elevations provided good runoff to most of the production areas. Some flooding of nests occurred in the early part of June from late rain storms and runoff from the snow pack.

The Central Valley received below normal rainfall over the entire area. Cool weather prevailed during May and June. The rice and associated vegetation which provides nesting cover was the same as 1963.

The spring was mild, and migration began early. By the end of April most of the birds had left the wintering grounds.

### Production index

The survey flights in the Central Valley were conducted on May 21 and 22, and those in northeastern California from June 1 through June 5. As summarized

<sup>1/</sup>

Credit is due Edward J. O'Neill and Robert Russell of the Tule Lake National Wildlife Refuge for gathering the data on that area.

in tables B-15 and B-16, the California waterfowl surveys indicate --

1. A 36 percent decrease in the breeding pairs of Canada geese and an 8 percent decrease in the total fall population.
2. The breeding pairs of ducks were essentially the same as 1963; the fall population showed an increase of 7 percent.
3. The total fall population of coots showed a 45 percent increase.

## NEVADA

Data supplied by C. V. Oglesby  
Nevada Fish and Game Department

### Weather and habitat conditions

Late winter snowfall and spring rains resulted in considerable improvement in water and habitat conditions in Nevada. Early season forecasts for stored water and streamflow were poor, but late winter and spring storms brought above normal precipitation throughout the northern part of the State.

Reservoir storage as of April 1, 1964, was estimated at 85 percent of average, with some reservoirs above average. East slope Sierra streamflow was down, but stored reservoir water was adequate to offset most deficiencies in western Nevada. Habitat conditions continued to show improvement in western Nevada, and natural marshes and management areas are being restored.

In contrast to the below average Sierra snow pack, the snow pack in the Humboldt River drainage in northeastern Nevada was near or above average. This improved streamflow and nesting habitat along stream courses was good. Flooding occurred along the Humboldt River resulting in some loss to early nesting species. Water conditions appear adequate for good brood survival in most key production areas.

### Breeding population index

The 1964 duck breeding population showed an increase of 47 percent over

1963. Dabblers increased 36 percent and divers were up 58 percent. The Canada goose breeding population was up 15 percent over 1963. (Table B-17.)

### Production index

Results of brood surveys indicate an increase in duck production over 1963 of 111 percent. Increased production was noted in all major nesting species. A total of 6,477 young ducks was observed this year on established sample areas as compared with 3,069 young in 1963 (table B-18).

### Conclusions

This is the second consecutive year of improved habitat conditions and increased waterfowl production in Nevada. Indications are that the State's contribution to the fall flight of ducks in the Pacific Flyway will be the highest since 1958.

## UTAH

Data supplied by Donald A. Smith  
Utah Department of Fish and Game

### Weather and habitat conditions

Utah experienced one of the most extended cold periods of recent years during the winter of 1963-64. Severe cold and heavy snows persisted from about December 15, 1963, through March 28, 1964, throughout Box Elder, Cache, and Rich Counties in northern Utah. Three days later, after a sudden thaw all this snow was gone and there was literally water everywhere. Rains began shortly thereafter over the majority of the State and continued into mid-June. As a consequence, extremely high waters persisted on all marshes, both natural and man-made, to the end of June.

All irrigation reservoirs are full, and supplies are being diverted. This should result in good water over the State's

marshes throughout the summer and into the fall.

### Breeding population indexes

No major change in species composition of breeding ducks was noted in northern Utah, although a reduction in divers was noted in the southern trend areas. The "slack" created by lower numbers of red-heads and ruddy ducks on these marshes was taken up by green-winged teal. The substantial increase noted in teal could be a result of the retarded migration. There was a 4 percent decrease in mallards and a 3 percent increase in gadwalls on southern marshes. (Tables B-19, B-20, and B-21.)

### Production indexes

Apparently the late spring affected Canada goose production in Utah. Both the numbers and the size of broods on marshes of the northwestern portion of the State were down significantly from 1963 (table B-22).

Counts of a moult flock of geese on Neponset Reservoir in Rich County revealed a 20 percent increase in the size of this population from 1963. This indicates that (1) there were more geese of a nonbreeding age contributing to this moult flock population, (2) there were breeding geese which failed at nesting and migrated to the moult area, or (3) a combination of these factors took place. It is likely the latter occurred in view of the high goose population we had in 1963 and considering the weather during the spring of 1964.

The continued increase in numbers of broods indicates that a significant proportion of production losses on northwestern marshes was caused by weather and suggests that flooding was a primary factor. This area experienced the same severe weather conditions as the more western marshes, but because goose nesting there is primarily confined to hay stacks, losses were minimal. The greatest number of broods and young geese was recorded in Rich County since counts were initiated in this area.

## Conclusions

Observations more recent than the brood counts indicate that, because of the abundance of water during May and June, broods may have been scattered and production was not as low as the counts suggested. This was specifically noted in the Ogden Bay marsh from distant areas which had been flooded but were drying. These temporarily flooded areas were not included in the brood surveys. It is possible the water factor could have an influence on counts made on other areas as well as Ogden Bay.

It is concluded that Canada goose production in Utah is down from 1963, but the reduction is not as pronounced as first suspected. The loss was due to failure to nest, and not to a reduced breeding population.

## IDAHO

Data supplied by Elwood G. Bizeau  
Idaho Fish and Game Department

### Weather and habitat conditions

Spring temperatures throughout Idaho were below normal. Spring precipitation was above normal. This weather combination resulted in one of the most retarded waterfowl nesting seasons on record. Goose nesting in particular ranged from 2 to 3 weeks later than usual in all major production areas.

Spring waterfowl movements were generally late and spread over a longer period than normal. This pattern tended to obscure peak counts and made comparison with former years impractical.

Flooding was a general problem in southeastern Idaho in late spring as the heavy snow pack melted. Most reservoirs were full to overflowing by June, and considerable early duck nest loss occurred.

### Breeding population indexes

Total geese for all units was down slightly (-7 percent) from 1963 but re-

mained far above the long-term average. The one major unit which showed a large drop in breeding numbers from 1963 was Dingle Marsh in southeastern Idaho (table B-23).

### Production indexes

For all Idaho units combined, gosling production was 14 percent below the top production year of 1963 and 14 percent above the long-term average. Gosling production for the resident goose flocks of southwestern Idaho was down slightly from 1963 (-5 percent) but 32 percent above the long-term average (table B-24).

For the largely migratory goose flocks of southeastern Idaho, production was down appreciably from last year (-35 percent) and down from the long-term average (-28 percent). A variety of local losses including flooding, predation, and nest disturbance by fishermen caused the drop in goose production for southeastern Idaho. The primary factor which triggered the local production losses was the delayed nesting caused by winter extending well into the normal spring period.

Duck production trend routes were censused at Blackfoot Reservoir in southeastern Idaho and on the Milner Canal in south central Idaho. Routes were run twice with all classes of broods counted on the early July run and only class I broods included for the late July survey. The duck brood trend on both routes was down somewhat from the excellent production year of 1963 (table B-25). Other brood routes were run only once because of the extremely late duck nesting season, hence are not comparable with previous years' data and are not included in this report. Good distribution and abundance of water and evidence of much renesting indicate that the current year's duck production in Idaho will be above average by the end of the season.

## SOUTHERN SASKATCHEWAN

Data supplied by Rossalius C. Hanson  
and Gerald Pospichal  
Bureau of Sport Fisheries and Wildlife

## Weather and habitat conditions

The Saskatchewan prairies this spring had a variety of water conditions, from excellent in stratum A-East to very poor in stratum C. The prairies were generally very dry in the fall of 1963. The winter snowfall was near normal but did not bring water in the ponds up to their normal levels. Rainfall from April 1 to May 25, 1964, was up 0.6 of an inch from normal. This put water in a number of depressions but still at a very shallow depth.

The May pond indexes in 1964 for strata A-West, B-West, and C were below those of 1963. Strata A-East and B-East were up, with A-East showing an increase of 112.2 percent. The total pond index this May was 1,188,700 compared with 960,400 in 1963, an increase of 23.8 percent. This increase was due mainly to the major improvement in A-East. At the outset this looks good, but the water was universally poor in quality except in A-East. In most areas the ponds had only a few inches to a foot of water. Most of them were still 1 to 3 feet below their normal levels. Water conditions in eastern Saskatchewan should hold up relatively well throughout the production season, but most of the other areas will have to be supplied with adequate summer rains. The Coteau, north and east of Johnstone Lake, was the poorest we have seen.

Temperatures from mid-April to May 25 averaged 3° to 5° above normal and broke some all-time high records. Regina had 94° as its highest reading. From May 1-25 the wind averaged 18.4 miles per hour each day. Spring was a week to 10 days ahead of normal. The warm weather produced early emergent vegetation and leafing of trees and shrubs. By mid-May, vegetation in the parkland areas was well-leaved.

Habitat and weather conditions for nesting were good. The early growth of pond vegetation in addition to emergent plants from last year afforded adequate cover. Practically no burning was noted, and there appeared to be little seeding of stubble. The soil moisture for seeding

of grain was adequate. However, after the unusually warm spring and high winds, forecasts for agricultural crop moisture needs indicated a necessity for rains to insure crop success. This may have discouraged stubble seeding to some degree.

Drying trends continued through early July except for scattered rains generally in the east and central parts of the Province. Overall, the water loss from May to June was 63 percent. The July pond index for 1964 (439,500) was the third lowest on record, down 36.2 percent from 1963 (689,100) and down 68.1 percent from the 1952-63 average (table B-26). In parts of A and B-West, the number of dugouts and stock dams exceeded the number of natural water areas in July.

## Breeding population indexes

The total duck population index stood at 1,681,200 birds this year compared with 1,539,300 last year, with an average of 3,427,900 for 1956 to 1963. Dabblers and divers showed increases over last year of 7.9 and 21.5 percent, respectively, down 49.7 and 60.1 percent from the averages. The coot population increased 64.9 percent over last year, but they are still 76 percent below the average (table B-27).

The lone drake index of 83.5 percent agrees with all other indicators of an early season. The percentage figure for this year is the second highest on record (table B-28).

## Production indexes

The 1964 duck brood index was up 46 percent from the low of 1963 but still remained 71 percent below the average, and the third lowest on record. Data from both the aerial and ground observations indicate poor success from early nesting efforts in the south part of the Province. As indicated by age classes in observed broods, early nesting success improved as we moved northward in the survey area. Average brood size from class II and III broods was 5.7 as

compared with 5.4 in 1963. The coot brood index was up 76 percent from 1963 but down 75 percent from the average (table B-29).

The drying trends from May through early July caused a 63 percent drop in the water index by the time of the July coverage. Except for the extreme north and east borders of the survey area (parkland type), water generally remained mainly in the larger permanent type areas, dugouts, and stock dams. These, in most cases, were open types with mud flats and little vegetation and allowed a greater proportion of total broods present to be observed. This condition also concentrated the birds.

The Saskatchewan 1964 late nesting index was 28.9 percent below 1963 and 49.8 percent below the long-term average. It is the third lowest on record. Dabblers, which comprised 66 percent of the late nesting index this year, were down 42.1 percent and 59.5 percent in the above comparisons.

Both air and ground crews conducting air-ground visibility checks reported large numbers of adults of both sexes which had apparently abandoned their nesting efforts and assembled on lakes.

## MONTANA

Data supplied by Dale Dewitt  
Montana Department of Fish and Game

### Weather and habitat conditions

Water conditions declined in the three eastern areas but are still average or better. There was improvement in the Great Falls Piedmont which had been a drought area the last 4 years. The May water condition in the unglaciated prairies were equal to or down slightly from last year, which was one of the best years on record. The May water conditions in the Flathead Valley or Pacific Flyway portion of the State were average or better.

The late water conditions could be considered improved in nearly all areas in

the State. In several areas records were set causing some of the worst flooding in history on the river systems.

In the Great Falls Piedmont the June and July water conditions were probably better than any ever recorded (table B-30).

### Breeding populations indexes

The May survey of the glaciated subdivisions indicated an increase in total ducks over last year. In the unglaciated prairie the waterfowl index is above average. On the McCone County trend area the waterfowl index was 2.1 ducks per square mile compared with 1.6 ducks per square mile for the 12-year average and 3.7 ducks per square mile last year. The waterfowl breeding population from the Flathead Valley trend is not included this year because of incomparability of data.

In the Hi-Line Unit the Canada goose trend census during the early nesting season indicates an increase in breeding birds over last year (table B-31).

### Production indexes

Production and breeding conditions in the Central Flyway portion of Montana should be excellent. There undoubtedly was some flooding in the river valleys in the Great Falls Piedmont, but considering the improved water conditions in the potholes and reservoirs in this unit the number of birds using the river valleys would be insignificant.

In the Pacific Flyway (Flathead Valley), production and brooding conditions are generally very good. Even so, the production trend in this unit decreased from last year, probably because of poor counting conditions. It is possible the production is off somewhat, but probably not as much as the data suggest.

In the East Slope Unit, the population trend during the nesting season was down slightly from last year (table B-32).

There was some flooding in this unit, and the count may be down because of poor census conditions on the Marias

River, which was at flood stage, and on Alkalie Lake, which was 3 or 4 times its normal size.

### TRI-STATE AREA (NORTH AND SOUTH DAKOTA AND MINNESOTA)

Data supplied by Glen V. Ortin  
and Bonar Law  
Bureau of Sport Fisheries and Wildlife

#### Weather and habitat conditions

There was very little spring runoff, and pothole conditions were poor over most of the survey area until mid-April. Heavy local rains improved the water situation in scattered districts of the tri-State area from mid-April to early May. During May, 80° to 90° temperatures and strong winds practically nullified the earlier gains in water levels in the Dakotas. The May 1964 water index was down 47 percent from 1963 and down 17.1 percent from the 6-year average. Total precipitation for the year remained below average over most of the survey area. Many potholes that produced broods in 1963 were dry by mid-April.

Farming operations were about 10 days behind the 1963 schedule, although soil moisture conditions were good. Burning of dry sloughs and roadside ditches was observed during May and probably destroyed some of the early nesting attempts.

The poor pothole conditions in north-central South Dakota and south-central North Dakota were considerably improved by very heavy local rains in June. Conditions over the remainder of the survey area, except extreme northwestern North Dakota and west Minnesota, remained poor (table B-33).

#### Breeding population indexes

Dabblers decreased 35.8 percent from 1963, but were about equal to the 6-year average. Canvasback and redheads increased 16.7 percent and 17.9 percent

respectively compared to 1963, and 75 percent and 80 percent compared to the long-term average. Scaup and ruddy ducks showed major declines in both of the above comparisons.

In summary, the total duck index for the tri-State area is 36.8 percent below 1963 but about equal to the 6-year average. Coots were 29.5 percent below 1963 and 27.2 percent below the average (table B-34).

The lone drake index of 67.6 percent indicates that nesting was well under way (table B-35).

#### Production indexes

From all indications early nesting efforts were very poor. The tri-State brood index was 31.7. Total duck broods decreased 70.7 percent from 1963 and 49.5 percent from the 6-year average. Average brood size in 1964 was 6.0 compared with 5.2 in 1963. Coot broods decreased 34 percent from 1963 and 17.1 percent from the average. Ground observations of the air-ground comparison crew and banding crews in the Dakotas tend to substantiate these figures (table B-36).

### NEBRASKA

Data supplied by George Schildman  
Nebraska Game, Forestation and Parks  
Commission

#### Weather and habitat conditions

Water conditions during the breeding ground survey were generally good. Heavy rains during the last week of April filled the lakes in the central Sandhills. The eastern part remained much below normal while the western areas were only a little below normal. The projected water index for all of the Sandhills was 55,977.

Weather conditions during the spring were dry and cool. Temperatures remained relatively cool until mid-June. There were no late freezes this year.

Good general rains did not occur, but local rains maintained water levels in the central Sandhills.

### Breeding population indexes

The waterfowl index for the Sandhills was up 16.6 percent from last year and 9.7 percent above the average of the previous 5 years. The calculated breeding population for the Sandhills was 124,809 ducks of all species.

Most notable changes in the species composition of the breeding population was a 55 percent decrease in blue-winged teal and an 83 percent decrease in gadwall. Mallards and pintails showed increases of 78 percent and 84 percent respectively. Shovelers remained about the same as last year. Scaup, redheads, and canvasbacks showed substantial increases, while ruddy ducks declined from 5,300 to 880. (Table B-37).

### Production indexes

A total of 75 broods were observed on the July aerial survey. Good counts were obtained on 63 broods with a total of 295 ducklings. The total number of broods sighted was down 30.0 percent from the 1963 figure, and the number of ducklings was down 44.2 percent. Ground route indexes indicate broods down 48 percent and ducklings down 49 percent. The number of ducklings per brood from the aerial counts was 4.68, a decrease of 1.20 from 1963, while the average brood size from ground routes indicates a drop from 5.42 to 5.31. (Table B-38.)

The hatch appeared to be as much as 2 weeks later than last year. New broods were still appearing during the third week of July. According to the aerial surveys, 5.8 percent of the ducklings sighted were class I, 38.6 percent were class II, and 55.6 percent were class III (table B-39).

## WYOMING

Data supplied by George F. Wrakestraw  
Wyoming Game and Fish Commission

### Weather and habitat conditions

Range and water conditions at the start of the spring migration were good over most of the State. During May and early June great amounts of moisture fell over most of the State, maintaining extremely good water conditions. The number of water areas in the production sections of the State remained nearly constant through July.

### Breeding population indexes

The estimated breeding pair population for 1964 decreased 6 percent from 1963 but increased 20.5 percent over the long-term average.

### Production indexes

The total number of birds counted in 1964 was 301,705, 1 percent above 1963 and 28.8 percent above the 8-year average (table B-40).

Canada geese decreased 2 percent from 1963 but were 53 percent above the long-term average.

Goose production surveys on Bear River, Snake River, and Ocean Lake indicate an extremely successful year (table B-41).

## COLORADO

Data supplied by William H. Rutherford  
Colorado Game, Fish and Parks  
Commission

### Weather and habitat conditions

Weather conditions in Colorado during the spring and early summer were considered good to excellent for waterfowl nesting and production. The phenology of the season was retarded, so that nesting was not started as early as usual, but weather was not an adverse factor. Water conditions were somewhat better than those of last year, but still only fair. Early spring precipitation vastly improved

what had started out to be a dry season. It appears that sufficient water is available for nesting and brood rearing in all areas of the State except the San Luis Valley.

### Breeding population indexes

The 1964 counts were up 17.2 percent from 1963, and 98.4 percent above the 1954-1963 average.

In an attempt to refine the sampling technique in the San Luis Valley, aerial transect coverage was doubled and air-ground comparison transects were established. This permitted a better estimate of the total breeding population and a considerably improved estimate of species composition (table B-42).

Species composition was about the same as those of past years. Pintail, widgeon, shoveler, and redhead were up somewhat, with other species stable or slightly down (table B-43).

### Production indexes

The western slope Canada goose breeding flock has been steadily increasing the past several years. The largest number of adult geese and the highest indicated level of production since the beginning of the study in 1956 occurred this year (table B-44).

### NORTHERN SASKATCHEWAN, NORTHERN MANITOBA, AND WESTERN ONTARIO

Data supplied by Arthur R. Brazda  
and Gust J. Nun  
Bureau of Sport Fisheries and Wildlife

### Weather and habitat conditions

Spring breakup was early, but high winds and a recurrence of winter conditions delayed completion of the survey. Snow showers were encountered as late as June 6. On June 1 thousands of snow and blue geese were concentrated along the bay

shore around Winisk owing to the severe winter conditions there and farther north. Northern Saskatchewan and northern Manitoba were very dry throughout the summer. Except for scattered light showers, northern Saskatchewan was void of rain from early May until mid-July. On July 10 there were 57 forest fires in the Prince Albert District alone, some of them large.

Water conditions on Saskatchewan 1 were only fair in the Big River area, but good in the Meadow Lake area and along the Beaver River. In Delta 1 and 2, water appeared to be down slightly from 1963. In Manitoba, habitat conditions appeared adequate in the eastern two-thirds of the province, but only fair in the western third. Water conditions in Ontario were equal to or better than 1963.

### Breeding population indexes

Overall, the duck population increased 3 percent from 1963. Small increases in Manitoba and Saskatchewan south of 55° 30'N. were mostly offset by an 11 percent decrease in Ontario. The coot population decreased 56 percent. The Canada goose breeding population decreased 11 percent. The total duck population index in 1964 was 812,146 compared with 787,657 in 1963 corrected for comparable coverage. (Table B-45.)

### Production indexes

The production index increased by 217 percent over 1963. Only Ontario indicated a slight decrease. The age classification suggested that the first nesting attempt was excellent. Class II and III broods represented 89 percent of all broods observed (tables B-46 and B-47). Class II and III broods averaged 5.0. Canada goose broods averaged 3.1.

### SOUTHERN MANITOBA

Data supplied by Morton M. Smith  
and Duane Norman  
Bureau of Sport Fisheries and Wildlife

## Weather and habitat conditions

Vegetation at the beginning of the survey was considered normal for the area. Aspens and willows, fully leafed out by the time the more northern transects were covered, reduced the efficiency of aerial observations on some areas.

Manitoba stratum A had more water areas in May 1964 than in any previous year of record, up 34 percent over 1963 and 54 percent above the 11-year average. In stratum B, the same number of water areas were recorded in 1963 and 1964. The B counts for the last 2 years are 11 percent below the 11-year average. When the 1964 figures for strata A and B are combined, the number of water areas tallied is the third highest on record and 15 percent higher than the 11-year average.

Habitat conditions in southern Manitoba continued better through July than in any year since the late 1950's. The July pond counts were higher than in any recent year but still below the long-term average (table B-48).

Conditions in stratum B this year did not appear quite as favorable as in 1963. In spite of a higher pond count in 1964 many of the marshy areas east of Lake Manitoba were low or dry, and pond levels on the three most northern transects were lower this year than last.

## Breeding population indexes

The 1964 duck population index was 5 percent less than in 1963, and 28 percent below the 11-year average. The dabbling duck index was down 12 percent and 40 percent, respectively. The diving duck index increased 9 percent above 1963, and nearly 10 percent above the 11-year average. Coots increased 3 percent over 1963 and the index now equals the long-term average (tables B-49 and B-50).

The 1964 lone drake figure of 78 percent is lower than that of 1963 but about average for southern Manitoba (table B-51). The first brood were seen on May 22--the same date the first brood was

spotted in 1963. Three additional broods were seen on May 24th.

## Production indexes

The duck brood index for strata A and B in southern Manitoba was 22 percent lower than that of 1963 and 27 percent below the long-term average. The coot brood index for the survey area was 266 percent greater than in 1963 and 78 percent above the 10-year average (table B-52).

The 1964 index to late nesting for the entire survey area was 10 percent below 1963 and 26 percent below the long-term average (table B-53). Despite evidence that many early nests were lost and that the 1964 hatch was later than that of 1963, fewer adults were recorded on the transects (table B-54). By mid-July, the growing concentrations of adults on the larger water areas indicated that many ducks were through nesting for the season although habitat and weather conditions appeared favorable for a late nesting effort.

## CHIPPEWA NATIONAL FOREST, MINNESOTA

Data supplied by Harry Pinkham  
Bureau of Sport Fisheries and Wildlife

## Weather and habitat conditions

The water level reading at the Winnibigoshish Dam was 10.07 feet, 0.36 feet less than normal but 0.17 feet above the water level during the 1963 census.

## Breeding population indexes

This year's survey indicates a 7 percent increase in the breeding population from the 1963 census (tables B-55 and B-56). The ratio of adult to young dropped from 1:2.5 in 1963 to 1:1.6 in 1964 (table B-57).

## MICHIGAN

Data supplied by Edward J. Mikula  
Michigan Department of Conservation

We estimate that State-wide production of waterfowl in 1964 was about 10 percent lower than in 1963 (table B-59).

### Weather and habitat conditions

Winter was relatively mild with precipitation below normal and temperatures above normal. Most southern waters were ice-free by early March and those in the northern part free of ice by late March or early April. As a result of these weather conditions, the spring waterfowl migration was considerably earlier than in 1963.

Precipitation during April, May, and June was below normal over most of the State. Near-record low water levels on the Great Lakes have markedly reduced useable shoreline nesting habitat. Inland water habitat appears to be about the same as last year. Temperatures during the nesting period were normal to above normal. Weather conditions had no adverse effect on nesting and brood production this year.

### Breeding population indexes

The waterfowl breeding population was the third highest in 15 years but down 15 percent from 1964 (table B-58).

The percentage of mallards, blue-winged teal, and mergansers in the breeding population dropped this year, while the wood duck, black duck, and ring-necked duck population increased.

### Production indexes

The number of broods tallied per lineal mile of census route was down 26 percent from 1963. Brood size was slightly larger but not enough to offset the smaller number of broods.

The number of breeding wood ducks per lineal mile of census route was below that of last year, but was offset by a significant increase of wood ducks in the total local breeding population. Brood size averaged 6.5 young per adult.

## WISCONSIN

Data supplied by  
Wisconsin Conservation Department

### Weather and habitat conditions

Wisconsin received spring rains early enough to provide breeding habitat over most of the State on a level comparable to 1963.

Water levels declined steadily through the month of June when hatching was at its peak, but rainfall in July was good and maintained brood habitat.

### Breeding population indexes

Slight increases were noted in wood ducks. Mallard and blue-winged teal remained at about the same level as 1963. Although overall blue-winged teal numbers were unchanged, there were noticeable declines in the northwest and southeast, where drought has been most severe (table B-60).

Utilization of nest boxes by wood ducks was about the same as 1963. Of 199 houses checked, 17 percent were used. This compares with 18 percent use of 65 houses checked in 1963.

### Production indexes

Production should be unchanged to slightly less than that of 1963. The increased breeding population got off to a late start in nesting. First mallard broods were observed on May 27, about 2 weeks later than in 1963. Brood sizes were smaller than average for the important species. Late broods will not offset the effects of the late season.

Blue-winged teal production will be less than last year, mallards about the same, and wood ducks may be slightly lower. The observations on all other

species are limited but suggest average production (table B-60).

## INDIANA

Data supplied by Russell Hyer  
Indiana Department of Conservation

### Weather and habitat conditions

Water conditions during the breeding season were highly variable. Rainfall during the spring and early summer in the southern and central parts of the State were the heaviest for this period in recent years. In the northwestern counties, moderate to severe drought conditions have persisted for approximately a year. In northeastern Indiana, conditions have been normal.

### Production indexes

During the 1964 stream survey, 57 wood duck broods were observed, a decrease of 62.0 percent from last year. Average brood size was 6.3 (table B-61).

## IOWA

Data supplied by  
Iowa Conservation Commission

### Weather and habitat conditions

A dry fall and winter left many of the small potholes in northern Iowa very low or dry this spring.

Good rains in April helped relieve the situation some, but below normal rainfall in May, June, and July resulted in most of the small potholes going dry before broods started showing themselves. The bigger State-owned and private areas held good water levels during the spring production period. Over 75 percent of the potholes of 4 acres or less were dry by the first week of July.

High water levels and high muskrat populations on the larger State-owned areas the last 3 years have resulted in a notable decrease in the quantity of emerg-

gent vegetation on the areas. Many of the larger areas that have no water control structure have very little or no emergent vegetation this year.

### Breeding population indexes

Waterfowl flights moved into Iowa this spring a week or two ahead of normal. Early nesting was held back by cold and rainy weather. A sharp freeze the latter part of April froze over the marshes and killed quite a few coot and diving ducks. Nesting of mallards started the first week of May. Blue-winged teal nesting started the first week of June. Broods started showing up 1 or 2 weeks later than normal this spring.

### Production indexes

Information from drive trapping shows that blue-winged teal production was down 25 to 30 percent from the extreme high of 1963, but still very good when compared with a 10-year average. Mallard and redhead production was down slightly from last year, and coot production was down 75 percent or more. The great drop in coot production was probably due to the lack of emergent vegetation, and extremely high winds this spring. Ruddy duck and the other nesters in Iowa compared quite favorably with last year. Wood duck production was up 25 to 30 percent in the prairie pothole region of Iowa. More broods of wood duck were seen and banded in 1964 than in any previous year. The production was late this year, but from all indications there will be a good late hatch.

Approximately 1,800 birds were banded this year in Iowa.

## MISSOURI

Data supplied by  
Missouri Conservation Commission

### Weather and habitat conditions

An early spring triggered early nesting by wood ducks in Missouri. Before the

June census was completed there were broods on the wing.

Precipitation during the spring of 1964 was 1 to 6 inches above normal. Flood conditions existed on many streams and bottomland marshes throughout the census period. The scheduling of stream census activities had to be arranged between floods.

### Production indexes

Wood duck nesting on marsh and lake habitat decreased by approximately 53 percent, while nesting on 730 miles of stream decreased by only 3 percent.

The number of broods sighted per mile of stream decreased from the all-time high recorded last year. The number of broods per square mile of marsh habitat decreased approximately the same. Decreases were also noted in average brood size (table B-62).

## SOUTHWESTERN MANITOBA

Data supplied by Charles H. Lacy  
Ducks Unlimited, Canada

### Weather and habitat conditions

Water areas increased 23 percent above 1963, but conditions varied greatly from one region to another (table B-63). Brush clearing, filling of potholes, and drainage continued at a high level. A dry, open winter permitted widespread burning of pond margins with damage to nesting cover.

### Breeding population indexes

The total index was 56 percent above 1963. Both dabblers and divers increased proportionately, with the exception of mallards, which are still 15 percent below the 1961 level (tables B-64 and B-65).

## ALBERTA

Data supplied by Ducks Unlimited (Canada)

### Weather and habitat conditions

The number of water areas decreased 36 percent below 1963 and 33 percent below the 10-year average in the Province as a whole, although conditions were better in a few localities. Good rains in early May provided excellent habitat in the extreme southern edge of the Province. The central prairies are still deep in the grip of drought.

### Breeding population indexes

On the basis of 271 transects the duck population as a whole showed no significant change. Small losses in pintail, mallard, and scaup were offset by gains in the other species (table B-66).

## SASKATCHEWAN

Data supplied by Ducks Unlimited (Canada)

### Weather and habitat conditions

Water conditions are good in the eastern parklands, but the western half of the Province and the southern prairies are in critical condition. There was sufficient water to initiate nesting but not enough without heavy rains to secure broods until fledged.

### Breeding population indexes

Provincewide the breeding population was 22 percent below 1963 but 54 percent below the 10-year average. Losses in the western half of the Province were compensated by increases in the parklands. Pintails, mallards, and gadwalls showed the greatest decline with blue-winged teal and most of the diving ducks increasing (table B-67).

## EASTERN ONTARIO, QUEBEC, AND LABRADOR

Data supplied by E. B. Chamberlain  
and C. F. Kaczynski  
Bureau of Sport Fisheries and Wildlife

## **Weather and habitat conditions**

Breakup in the southern and western portions of the survey area was about two weeks earlier than normal. Elsewhere, breakup varied from one week earlier to two weeks later than normal. By mid-June extensive portions of the area were experiencing moderate to severe drought conditions, but this did not appear to have any serious effect on waterfowl habitat. Lakes, rivers, and muskegs all appeared to have adequate water throughout the summer.

Over the survey area as a whole the most serious effect of the drought was the occurrence of numerous extensive and severe forest fires.

## **Breeding population index**

There was considerable variation in the population index both among species and among strata, but much smaller variations in the total waterfowl index (tables B-68 and B-70).

The percent of lone drakes indicates that there was more nesting in progress at the time of the survey this year than in any previous year (table B-69).

## **Production indexes**

The duck brood index and average size were down for 1964, -69 percent and -4 percent, respectively; the goose brood index was down 63 percent from 1963, but average brood size was up 14 percent (table B-71).

The late nesting index was up for all species except the Canada goose (table B-71). This upward trend may have been caused by the late breakup this year. However, if this is the cause it seems strange that the goose late-nesting index was down, since even as late as August 1 many of the lakes in the northern part of the survey area were more than 50 percent ice covered.

## **BANDING AND RECOVERY DATA**

### **RECOVERY RATES FROM 1963 PRE-HUNTING-SEASON BANDINGS OF MALLARDS AND BLACK DUCKS**

Data supplied by R. Kahler Martinson  
Division of Wildlife Research  
Bureau of Sport Fisheries and Wildlife

## **INTRODUCTION**

Pre-hunting-season banding of waterfowl provides data on the rate of band recovery which can be used to estimate rates of hunting kill. Band recovery rates can be examined to detect hunting pressure differences among age and sex cohorts within populations and/or the differences between populations. Several aspects of band recovery rates among mallards and black ducks have been discussed in U. S. Fish and Wildlife Service Special Scienti-

fic Report--Wildlife No. 60 (1959 and 1960 bandings), Migratory Bird Populations Station Administrative Reports 12 and 22 (1961 and 1962 bandings). The purpose of this report is to present the results of the 1963 pre-hunting-season banding program.

Cooperators in the 1963 pre-hunting-season banding program banded nearly 50 percent more mallards than they did in 1962. Important bandings in Saskatchewan by U. S. Game Management Agent E. M. Bosak and in Manitoba

by Flyway Biologist Morton Smith were responsible for much of the increase, but substantial numbers of birds were banded by the Minnesota Division of Game at Roseau River and by Bureau personnel at Shiawassee, Horicon, Agassiz, Upper Souris, Lower Souris, and other National Wildlife Refuges (table C-1).

The number of black ducks banded in 1963 was only slightly higher than in 1962. For the most part, bandings in 1963 were small and resulted in little usable data, but bandings from the States of Maine and New York were sizable and fair numbers of birds were banded in Ontario, Quebec, and Nova Scotia (table C-2).

Direct recovery rates from 1963 pre-hunting-season bandings of mallards and black ducks presented in this report were based on 100 or more banded birds. The numbers of banded birds used for calculating the rates in earlier years may be found in Special Scientific Report--Wildlife No. 60 and Administrative Reports 12 and 22.

## MALLARDS

### Recovery rates

The direct recovery rates of mallards banded in Pacific Flyway States showed no definite trend since 1962 (table C-3, p. 101). Recovery rates from six banding stations showed increases (among adult rates, three; immatures, three) while rates at seven banding sites decreased from 1962 (adults, four; immatures, three).

Among mallards banded in the Central Flyway, shooting mortality in 1963 appeared to be higher than in 1962. Direct recovery rates of adult mallards from five banding stations in Montana and the Dakotas increased markedly: the unweighted mean recovery rate in 1963 (4.2) for those stations was 150 percent higher than in 1962 (1.7). Recovery rates for immatures increased at all stations except Sand Lake National Wildlife Refuge in northeastern South Dakota. (Recovery rates for immatures banded at Sand Lake have been inconsistent with the rates for

the rest of the Flyway in other years also; for example, in 1962 the immature recovery rate increased while rates from all other banding stations decreased). The increase in the average recovery rate for immature mallards banded at those stations was over 100 percent, increasing from 2.4 in 1962 to 5.2 in 1963. Thus recovery rates for mallards banded in Central Flyway States increased significantly from 1962 and regained the level of rates that occurred in 1961 (table C-3).

Direct recovery rates of mallards banded in the Mississippi Flyway increased in 1963 but not to the extent of those in the Central Flyway. The unweighted average recovery rate for immature mallards from five comparable Mississippi Flyway stations was 7.4 in 1962 and 9.9 in 1963. The average rate for adults from three comparable stations increased from 4.2 in 1962 to 6.7 this year. These data suggest that kill rates for adult and for immature mallards in the Mississippi Flyway increased 60 and 34 percent, respectively.

Recovery data from mallard bandings in the Atlantic Flyway were too few to demonstrate any trend in kill rates. Comparable rates from banding stations in New York showed that rates from two stations decreased, one increased, and one was about the same as 1962.

Direct recovery rates of adult mallards banded in the Prairie Provinces of Canada showed a decline in 1963; rates of immature birds banded in that area showed a very slight increase from 1962. We might conclude that there was no change in the kill rates of mallards banded in Canada, but additional banding stations in Saskatchewan and Manitoba this year make the comparison with 1962 unreliable.

Not only have bandings in the Prairie Provinces been relatively small in recent years, but the locations of the banding stations have changed (hence, there is lack of comparability of data). One of the most apparent needs in the pre-hunting-season banding program is a series of well-distributee permanent

banding stations in Alberta, Saskatchewan, and Manitoba.

### Relative recovery rates

The extent to which one banded sex or age cohort is more apt to be shot than another may be found by comparing recovery rates of the two. Table C-4 contains relative recovery rates determined by comparing the direct recovery rates of immature mallards with those of adults and expressed as immature per adult rates. The unweighted average relative recovery rate from 12 comparable stations was 1.6 in 1963 compared with 1.8 in 1962. (Because the data were highly variable, Pacific Flyway banding stations were not included). The average rate for seven comparable banding stations in the Central and Mississippi Flyways decreased from 2.1 in 1962 to 1.4 in 1963. These data suggest that immatures were less vulnerable during the 1963 hunting season than in 1962. However, the magnitude and distribution of bandings must be improved before we can obtain a precise measure of an average relative recovery rate.

Relative recovery rates based on adult and immature rates frequently vary from one harvest area to another (table C-5). Recovery data from four banding stations have been separated into three harvest areas generally extending from north to south. Recoveries of mallards banded at the Souris Refuges in North Dakota show that immature birds were relatively more vulnerable than adults in Canada, and northern and southern United States, but the two age groups were equally apt to be shot in central United States locations. The relative recovery rates of mallards banded at Agassiz National Wildlife Refuge in Minnesota showed that immatures were progressively less likely to be shot as they proceeded south; for example, their relative recovery rate was 2.91 in the north, 1.19 in the central States, and 0.33 in the south. The north-south variation in recovery rates between the Souris banding sites and the Agassiz banding station may be partially explained by the fact that both mallard populations contribute to the kill in the southern Mississippi Flyway but

birds from the Souris sites have not sustained as high shooting pressure in the north as those from Agassiz. Immature mallards banded at Horicon National Wildlife Refuge in Wisconsin appeared to be most vulnerable in the vicinity of the banding site (2.51 times as apt to be shot as adults in Wisconsin) but considerably less vulnerable (relative to adults) in the remainder of the Mississippi and the Atlantic Flyways. Relative recovery rates for mallards banded at Shiawassee National Wildlife Refuge in Michigan also indicated that the chances of shooting an immature bird in the south was less than that for an adult.

Relative recovery rates can be calculated for differences in the vulnerability between the sexes also (table C-6). Relative recovery rates, expressed as males per female, show that males are more likely to be shot than females in most areas. Recovery rates from one station, Monte Vista National Wildlife Refuge in Colorado, suggested that adult females were more vulnerable to the gun than adult males. Immature birds of both sexes banded at that station appeared equally apt to be shot. Banding sites such as Monte Vista and perhaps Ruby Lake are unique in that mallard populations are nearly resident in behaviour and recovery data from them typify only these relatively small populations. Recovery data from bandings of mallards in Minnesota indicated that males and females were probably about equally vulnerable in that region also. Immature mallards banded at Howlands Island in New York showed similar recovery rates for males and females while those at Pymatuning Reservoir in Pennsylvania revealed a greater vulnerability for females.

## BLACK DUCKS

### Recovery rates

Direct recovery rates for adult and immature black ducks appeared to have decreased somewhat in 1963 (table C-7). The unweighted mean recovery rate for adults from four comparable stations was 9.8 in 1962 and 8.2 this year. The average

direct recovery rate for immature black ducks was 10.1 in 1962 and 7.6 in 1963 from seven comparable stations. Direct recovery rates in 1963 were lowest from bandings at Moosehorn National Wildlife Refuge in Maine and highest from bandings in Ontario.

A temporary closure of hunting seasons because of fire hazard in the northern part of the Atlantic Flyway resulted in a generally later opening date for most of those States (8-14 days later). This could have caused a decrease in the kill rates of black ducks. However, the small number of bandings made it difficult to evaluate kill rates among black ducks.

### Relative recovery rates

Relative recovery rates calculated for black ducks banded in most areas showed that immature birds were more likely to be shot than adults in 1963 (table C-8). However, bandings in Ontario showed that, among black ducks shot in the United States, adults were more apt to be shot than immatures. Recovery data from bandings at Parker River National Wildlife Refuge in Massachusetts suggested that adults were more likely to be shot than immature black ducks. The delay of the openings of the hunting seasons mentioned above may have been responsible for the typical relative recovery rate of black ducks banded at Parker River; for example, many of the immatures could have left before hunting seasons in adjacent States opened and thus were not subjected to the usual gunning pressure. In fact, the distributions of recoveries for immatures showed that about one-third of the immatures were shot south of New England in 1963, whereas all of the 1962 recoveries of immatures occurred in the northeast.

A good measure of the relative rate of recovery for adult and immature black ducks is of paramount importance in the understanding of age ratios in that species. Age ratios in the kill of black ducks have changed markedly in the past by recovery data suggest that some of the changes are due to changes in the relative vulnerability between adults and immatures. Therefore, it is very important that we have adequate

bandings for future evaluation of the population phenomena among black ducks.

Regional relative recovery rates for black ducks banded in the States of Maine and New York were calculated to investigate the variation in vulnerability between the age groups in the North and South (table C-9). Recovery data from Maine bandings showed that immatures were 1.40 times as apt to be shot as adults in the general latitude of Maine and north; this rate decreased to 1.16 south of Maine. Among black ducks banded in New York, immatures were nearly twice as likely to be shot as adults in New York and north, while they were only 0.73 times as vulnerable to the gun as adults south of the State in which banded.

### DISCUSSION

The increase in direct recovery rates among mallards in the Central and Mississippi Flyways was concurrent with a general liberalization in the bag limit and season length in those Flyways. Although season lengths were increased but little in 1963, the daily bag limit for ducks was increased from two to four and the mallard limit from one to two. These liberalizations were expected to increase the kill of waterfowl. For the second consecutive year, recovery rates from mallards banded in Canada failed to change with a change in Federal regulations. However, comparisons of recovery data from Canadian bandings have thus far been of doubtful validity.

Relative recovery rates (immature:adult) for mallards seemed to be lower in 1963 than in 1962. This occurred because the increase in recovery rates for adults was greater than that for immatures in both the Central and Mississippi Flyways. It was suggested in Administrative Report 22 that high relative recovery rate of 1962 might have been a result of the short hunting season. The small bag limit may also have been a factor, and it could be speculated that the 1963 bag liberalization resulted in the lowered relative recovery rate this year. At any rate, regulation liberalizations could have influenced a change in the relative recovery rate by allowing a

higher rate of kill and by affecting a slightly higher proportionate kill in the

South where low relative recovery rates are characteristic.

## PRESEASON BANDING AND RECOVERY RATES FOR BLUE-WINGED TEAL, 1962 AND 1963

Data supplied by R. Kahler Martinson  
Division by Wildlife Research  
Bureau of Sport Fisheries and Wildlife

The banding of blue-winged teal before the hunting season was stressed during 1962 and 1963, in Canada and in the Central and Mississippi Flyways because of interest in an experimental early hunting season designed to increase the harvest of this species. Pre-hunting-season bandings are necessary to measure the effects of such a hunting season on the rate of kill and to interpret the age and sex composition of the hunting kill. A few adult and immature blue-winged teal were banded during the pre-hunting-season period in 1962. In 1963 this banding program was expanded in the northern parts of the Central and Mississippi Flyways (table C-10). The bandings by many cooperators were lumped and show as regional or State totals.

The data show that direct (first hunting season) recovery rates for blue-winged teal are very low. Geis, Smith, and Goddard (1963, Administrative Report 18) noted that recovery rates for blue-winged teal were the lowest among the more common ducks in the bag. They found that direct recovery rates for blue-winged teal banded in the United States were higher than those for birds banded in Canada and, among Canadian bandings, blue-winged teal banded in Manitoba showed the highest recovery rates. The 1963 pre-hunting-season banding data for blue-winged teal seem to agree with those findings. In 1963, immature blue-winged teal banded in Minnesota and Iowa exhibited the highest recovery rates among all the adequate samples. The recovery rates for blue-winged teal banded in Manitoba were higher than the rates for teal banded in either Alberta or Saskatchewan.

Table C-11 contains a comparison of the direct recovery rates of blue-winged teal banded during 1963 with those available for 1961 and 1962. The data for 1963 do not show a definite trend from 1962. The unweighted mean direct recovery rate for adults in 1962 was 0.74 compared to 0.86 in 1963. The average recovery rate for immature blue-winged teal was 2.42 in 1962 and 2.14 in 1963. Thus it appeared that the kill rate for adults increased 16 percent in 1963, and that for immature blue-winged teal decreased 12 percent. However, these are rather fragmentary data from which to estimate kill rates and should be considered merely as a starting point for future banding of blue-winged teal during the pre-hunting-season period.

The low recovery rates of pre-hunting-season bandings of adult and immature blue-winged teal clearly demonstrate the need for relatively large banded samples to provide data for measuring rates of kill. This is particularly evident for adult birds which exhibit direct recovery rates of less than 1 percent from most bandings. The importance of large bandings of adults is accentuated when the migratory (and hence, kill) characteristics of adult males and females are considered. The fact that adult male blue-winged teal leave the breeding grounds earlier and appear to travel farther south than adult females seems to result in lower rates for hunting kill for the males. Hence, it is important to measure kill rates for both sexes among adults. These preliminary findings suggest that annual bandings of 1,000 each of adult males, adult females,

and immatures (sexes combined) may be necessary at most stations to evaluate the affects of special regulations on populations of blue-winged teal.

Although recovery data from the banding of flying birds provide the best measure of kill rates, we do have an impressive volume of recovery data from the banding of locals in many areas. For

example, it is now evident that kill rates for blue-winged teal banded as locals were higher during the early and mid-1950's than they have been since more restrictive regulations were enacted in the 1960's. Thus, in future years, data from the banding of locals will be important in analyzing the results of special seasons for blue-winged teal.

## HARVEST DATA

### COMPARISON OF HUNTERS' REPORTS AND SPY-BLIND OBSERVATIONS DURING 1961-62, 1962-63, AND 1963-64 HUNTING SEASONS

Data supplied by Samuel M. Carney and Glen Smart, Division of Wildlife Research,  
Bureau of Sport Fisheries and Wildlife

#### Objectives

This work was undertaken as a part of our studies to evaluate and improve the accuracy of mail surveys. The primary objective was to check the accuracy with which hunters participating in the duck wing collection survey report the time of day that they shoot each duck. Additional objectives were to determine the extent to which wings mailed by hunters are representative of the total bag, to estimate the proportion of their crippling loss hunters report in the mail questionnaire survey, and to learn whether the distribution of shots fired throughout the day reflects the distribution of the kill.

#### Procedure

During the 1961-62, 1962-63 and 1963-64 hunting seasons, field cooperators observed the actions of hunters from concealment and recorded them on special forms. The hunters were contacted in the field either immediately before or after the hunt. Those contacted before the hunt (5%) were given a supply of serially numbered envelopes equal to the number of hunters in the party or blind multiplied by the daily bag limit; those contacted after the hunt (95%) were interviewed and given a quantity of envelopes equal to the number of birds in their possession. Hunters

who disclosed that they had already received envelopes as part of the national duck wing collection survey were not given envelopes and were not included in this study. All "spy-blind" reports (439) and the respective duck wing envelopes were compared and analysed at the Migratory Bird Populations Station, Laurel, Md. Because findings from the 3 years appeared to be similar, the data were combined.

#### Results

During the 3 years of the study the hourly distribution of the observed kill of 889 birds could be compared with that reported by hunters. Hunter reports for these 889 birds were matched as nearly as possible with spy-blind observations for the same number of birds. Because hunters did not send wings from all birds they were observed to bag, it was necessary to omit some observed times. This comparison between field observations and hunters' reports showed considerable agreement (table D-1). To check on the possibility that a bias was introduced by omitting observations, the data obtained in 1961 were reexamined using all field observations. The results were so similar to the comparison made in 1961 that it was apparent the observed kills that were omitted had, in

the aggregate, the same distribution as those used in the comparison (fig. 1).

The difference in minutes between the reported and observed times of kill of the 889 birds is summarized in table D-2. Nearly one-half of the reports (49%) differed from the observations by less than 15 minutes, and only 18 percent by more than 1 hour. To check whether the omitting of observations had altered the comparison, the 1963 comparison was reexamined using only those forms for which hunters had reported the exact number of kills that were observed in the field. Here again, the results were similar to the comparison that had been made. The data indicate that although hunters may err in

reporting the time of day at which they kill a bird, most errors are small and tend to be compensating when viewed in the aggregate. The amount of agreement between reported and observed hour of kill is all the more noteworthy because 95 percent of the envelopes were distributed to the hunters after the hunt; thus the hunter had no prior notification to be aware of the time kills were made. The accuracy with which hunters report time of kill could be greater in the annual duck wing collection survey because all the hunters sampled receive envelopes with instructions before their first day's hunt.

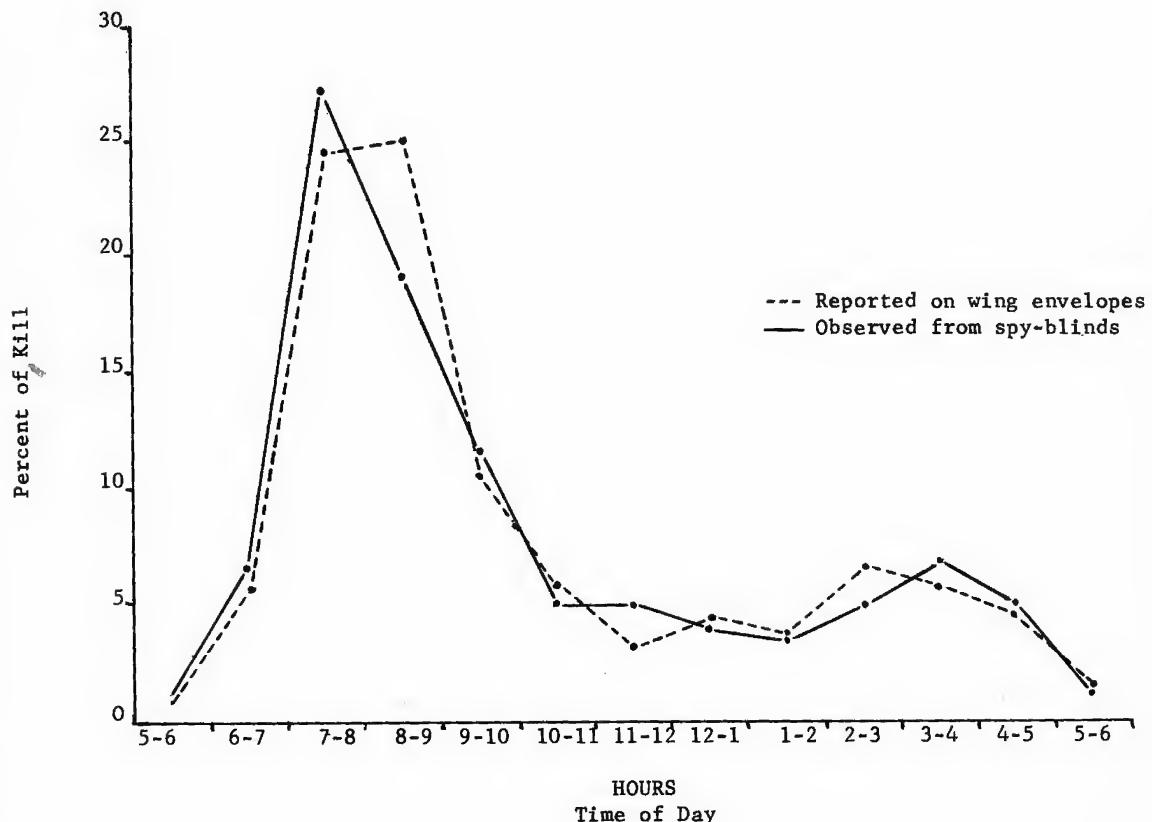


Figure 1.--Percentage comparison of 889 ducks killed by hours of day between hunter reports and spy-blind observations, 1961-62, 1962-63, and 1963-64 data combined.

The agreement between reported and observed time of kill indicates that the duck wing collection survey provides reliable information on the distribution of the kill within the day.

Spy-blind observers reported seeing 1,770 ducks bagged. Of the hunter groups given envelopes, 70 percent submitted wings from all or part of their bag. This represented 59 percent of the birds bagged. The reasons for nonresponse were examined but did not appear to be associated with hunting success or party size (table D-3). Although wings were not obtained from all birds known to have been bagged, we saw no evidence that the wings received were not a representative sample of the total bagged.

Before field work, the following terms were defined in order to maintain uniformity among the observers:

"Knocked down," those birds that fell immediately when shot.

"Sailers," birds obviously hit as evidenced by the fact that their normal flight characteristics were altered. This category did not include birds that merely lost feathers (some of which may have been cripples).

"Hits," the sum of those birds which were either knocked down or sailers.

"Bagged," only those birds hit and retrieved.

"Cripples," the difference between birds hit and birds bagged.

Field observers recorded a ratio of 0.47 cripples per bird bagged (table D-4). Hunters interviewed immediately following the hunt, however, reported only 55 percent of these cripples or 0.26 cripples per bird bagged (table D-5). A review of crippling losses reported by hunters for a 3 year period (1961-62, 1962-63, and 1963-64) through the mail questionnaire survey indicated that 0.25 birds were lost for every bird bagged. Despite the differences in the methods used to sample

"cripples," the fact that hunters contacted during studies reported similar ratio of cripples to birds bagged suggests that cripples may be underreported on the questionnaire survey also.

Field observations indicated that 10,272 shots were fired to bag 1,770 birds. The relation between shots fired and birds bagged throughout the day has been summarized by hour of the day in relation to either sunrise or sunset (table D-6). These data suggest that fewer shots may be required to kill a bird before sunrise and more shots near midday and that the ratio of cripples lost to birds bagged may be highest near midday. There was great variation among individual observations of cripples lost and shots fired to bird bagged, and the sample sizes associated with hours of the day were small. For these reasons differences among the ratios could have been by chance and no conclusions should be drawn at this time.

### Future spy-blind needs

In the 3 years' data we have seen no pattern of hunter response that might cause the sample of wings obtained not to be representative of the total kill of these hunters. Because this report indicates that the duck wing collection is now providing reliable information on the distribution of the kill within the day, future spy-blind studies need not include the distribution of the envelopes.

The largest unknown quantity remaining is the magnitude of crippling loss. Future spy-blind studies should concentrate upon gathering information that would lead to a better understanding of crippling loss. Field cooperators can also obtain information relating to hunters' abilities to recognize bonus birds and species that are partially or completely protected.

## WATERFOWL KILL SURVEY

Data supplied by M. Edwin Rosasco and Elwood M. Martin,  
Bureau of Sport Fisheries and Wildlife

## Scope and methods

Each year, immediately after the hunting season, the Bureau of Sport Fisheries and Wildlife conducts a national mail questionnaire survey of waterfowl hunters designed to meet the following objectives:

1. Estimate, at both flyway and State levels, the magnitude of the waterfowl harvest, the total number of hunters active during the season, the total number of hunter-days afield amassed by these hunters, and the average seasonal performance per hunter in terms of days hunted and waterfowl bagged.
2. Measure the relative changes in these estimates from year to year.
3. Assess the effects of changes in season length and size of daily bag limit on total bag and on hunter performance.

The 1963-64 hunting season marks the 12th consecutive year of the survey since its start in 1952.

Since there is no complete listing of waterfowl hunters, this survey, by necessity, uses as its sampling universe those post offices throughout the nation which sell Migratory Bird Hunting Stamps ("duck stamps"). This year, 2,736 post offices were designated to cooperate in the survey as "sample outlets." These sample outlets were randomly selected, within States, from four strata (small, medium, large, and very large) of post offices, based on actual dollar sales of duck stamps instead of from two strata (single, multiple) as in previous years. A further refinement in stratification was used--that of subdividing each State into several "geographic zones", while retaining the post office class strata within each zone. This year the geographic zoning of a number of States was revised from that of last year in an effort to make each zone a more uniform unit in regard to waterfowl hunter activity and success, thus increasing survey precision. Zoning also insures a more even distribution of sample outlets throughout a State.

Names and addresses of hunters are obtained by means of a business-reply "contact card" distributed to all persons buying duck stamps at sample outlets.

The card requests the individual's name and address, the number of stamps he purchases, the reason for his purchase, and the number of persons in his household under the stamp requirement age of 16 years who might hunt waterfowl during the season.

All contact-card respondents who purchase stamps for the purpose of hunting are mailed a hunter questionnaire at the close of the season. The 1963-64 questionnaire asks each hunter the total number of days he hunted waterfowl, his total bags of ducks, geese, and coots, and the number of each he knocked down but failed to retrieve. These data, in combination with the total reported sale of duck stamps by State, have been used to derive the various survey estimates.

All estimates are subject to several sources of error (as is true for most types of surveys). In addition to chance error due to random sampling variation, the estimates may be affected by mis-reporting (respondents may tend, for example, to exaggerate their bag). The estimates are further subject to non-response bias in that hunters who fail to respond may have differed from respondents in their hunting performance.

A further potential source of error, that of faulty reports of duck stamp sales, this year has again presented a problem, although not as serious as that of last year. Since it is necessary to present kill estimates no later than early July to be available for regulations meetings, the reported sales for the first three quarters of the fiscal year (July 1 to March 31) must be used in deriving total kill and activity estimates instead of the full year's sales (the sales for the last quarter of the fiscal year are not available until Mid-August). Before 1959, the three-quarter-year reports were generally identical to those for the full year, but since that time, a small but increasing percentage of sales have been reported during the fourth fiscal quarter (April 1 to June 30). Last year it became apparent, because of the magnitude of the fourth-quarter sales reports of many States, that the three-quarter

sales reports were definitely incomplete. Measures to correct this reporting lag were negotiated with the Post Office Department, and a substantial improvement in reporting has been noticed this year.

Because of some still-remaining incompleteness of the three-quarter fiscal year reports of certain States (especially Massachusetts, West Virginia, and Virginia), it was necessary to recompute parts of the 1963 analysis. The revised estimates, based on the full year's stamp sales, are presented in this report.

The 1962 estimates presented here for comparison with the revised 1963 estimates have also been recalculated utilizing the same stratification system used for the 1963 data and on the basis of full year's stamp sales.

As in each year since 1960, the flyway bag estimates for ducks, geese, and coots were adjusted for response bias in reported figures by using the correction factors calculated in that year. The hunting activity and bag of "junior hunters" have again been estimated by the use of expansion factors based on findings in previous years. The species composition of the duck and goose harvest is based on the results of the annual Duck Wing and Goose Tail Collection Surveys.

Previously, geographic zones were used mainly for the selection of sample outlets for the survey. This year, for the first time, they, together with the post office strata, have been used in the analysis of the data as well. This increase in number of strata used in sampling and in the analysis of data was made possible through the use of computer methods. Computer calculations were done entirely by the Migratory Bird Populations Station Machine Data Processing Unit.

The 1963 estimates have been derived from the responses of approximately 55,530 hunters contacted throughout 2,736 post offices (table D-7).

### Pacific Flyway

An estimated 2,741,500 ducks were bagged in the Pacific Flyway during the 1963-64 waterfowl season, an increase of 45 percent over the previous season

(table D-8). An additional 545,500 ducks were knocked down but not retrieved, for a total kill (bag plus cripples) of approximately 3,286,900 ducks. All States registered increases in the total duck bag as compared to the previous season.

Analysis of the total Flyway duck bag by species, as derived from data provided by the Duck Wing Survey, shows that the bags of five species--mallard (843,900), pintail (585,800), green-winged teal (376,300), American widgeon (324,400), and shoveler (256,900)--totaled 2,387,300 ducks or 87 percent of the Flyway bag of all species. The bags of most species of ducks increased, except for greater scaup, mergansers, and scoters, all of which showed decreases.

The total Flyway goose bag of an estimated 328,900 birds increased 54 percent over the previous season. An additional 64,500 geese were knocked down but not retrieved, for a total kill (bag plus cripples) of approximately 393,400 geese (table D-9). All States registered increases in the total goose kill except Arizona (-16%).

An estimated 72,000 coots were bagged in the Flyway, an increase of 7 percent over the previous season. An additional 52,300 coots were knocked down but not retrieved, yielding a total kill (bag plus cripples) of about 124,300 coots.

A total of approximately 268,020 waterfowl hunters were afield during an estimated 1,992,500 hunter-days (table D-10), registering a 12 percent increase in the number of active hunters and a 15 percent increase in total hunter-days over the previous season.

### Central Flyway

An estimated 1,078,600 ducks were bagged in the Central Flyway during the 1963-64 waterfowl season, an increase of 130 percent over the previous season (table D-11). An additional 264,800 ducks were knocked down but not retrieved, for a total kill (bag plus cripples) of approximately 1,343,500 ducks.

Analysis of the total Flyway duck bag by species, as derived from data provided by the Duck Wing Survey, shows that the bag of mallards (457, 400) comprised 42 percent of the total bag of all species. The bags of green-winged teal (125, 200), gadwall (116, 300), pintail (102, 900), and American widgeon (80, 900), together with mallards, comprised 82 percent of the Flyway bag of all ducks. The bags of most species of ducks showed substantial increases over those of the previous year.

The total Flyway goose bag of an estimated 264, 800 birds increased 37 percent over the previous season. An additional 46, 700 geese were knocked down but not retrieved, for a total kill (bag plus cripples) of approximately 311, 500 geese (table D-12). All States registered increases in the total goose bag as compared to the previous season, except Montana (-15%).

An estimated 22, 700 coots were bagged in the Flyway, an increase of 125 percent over the previous season. An additional 10, 300 coots were knocked down but not retrieved yielding a total kill (bag plus cripples) of about 33, 000 coots (table D-13).

All States registered substantial increases in the total duck bag, due both to increases in the mean kill of ducks per hunter and in numbers of active hunters. A total of approximately 227, 750 waterfowl hunters were active during an estimated 1, 471, 600 hunter-days, registering increases of 42 and 43 percent, respectively, over the previous season.

### Mississippi Flyway

An estimated 2, 519, 800 ducks were bagged in the Mississippi Flyway during the 1963-64 waterfowl season, an increase of 123 percent over the previous season (table D-14). An additional 689, 500 ducks were knocked down but not retrieved, for a total kill (bag plus cripples) of approximately 3, 209, 400 ducks.

Analysis of the total Flyway duck bag, by species, as derived from data provided by the Duck Wing Survey, shows that the bags of nine species—mallard (925, 500), wood duck (372, 300), blue-

winged teal (197, 800), lesser scaup (189, 100), green-winged teal (164, 100), ringnecked duck (123, 300), American widgeon (118, 300), gadwall (109, 100), and pintail (108, 700)—totaled 2, 308, 200 ducks or 91 percent of the Flyway bag of all species. The bags of most species of ducks showed substantial increases, except that the bag of greater scaup showed very little change (+2%) over the previous year.

The total Flyway goose bag of an estimated 180, 700 birds increased 44 percent over that of the previous season. An additional 35, 700 geese were knocked down but not retrieved, for a total kill (bag plus cripples) of approximately 216, 400 geese (table D-15). All States registered increases in the goose kill except Ohio (-4%), Alabama (-7%), and Indiana (-49%).

An estimated 225, 900 coots were bagged in the Flyway, an increase of 180 percent over that of the previous season. An additional 61, 900 coots were knocked down but not retrieved yielding a total kill (bag plus cripples) of about 287, 800 coots.

All States registered substantial increases in the total duck bag. The increases were usually due both to an increase in active hunters and an increase in the mean duck kill per hunter. A total of approximately 497, 610 waterfowl hunters were afield during an estimated 3, 141, 500 hunter-days, registering increases of 39 and 46 percent, respectively, over the previous season (table D-16).

### Atlantic Flyway

An estimated 889, 100 ducks were bagged in the Atlantic Flyway during the 1963-64 waterfowl season, an increase of 22 percent over the previous season (table D-17). An additional 220, 400 ducks were knocked down but not retrieved, yielding a total kill (bag plus cripples) of approximately 1, 109, 500 ducks.

Analysis of the total Flyway duck bag by species, as derived from data provided by the Duck Wing Survey, shows

that the bags of five species--black ducks (217,900), mallards (140,900), wood ducks (125,000), ring-necked ducks (68,600), and green-winged teal (61,800)--totaled 614,200 ducks or 69 percent of the Flyway bag of all species. The bags of most species of ducks increased. The bag of greater scaup decreased 13 percent, whereas the bag of old squaw and eider decreased 32 percent and the bag of scoters decreased 17 percent.

The total Flyway goose bag of an estimated 161,000 birds increased 42 percent over the previous season. An additional 27,300 geese were knocked down but not retrieved, for a total kill (bag plus cripples) of approximately 188,300 geese (table D-18). All States registered increases in the goose bag except Connecticut, Florida, Massachusetts, and West Virginia, which decreased, and

Rhode Island, which showed no change over the previous season (table D-18).

An estimated 47,300 coots were bagged in the Flyway, an increase of 25 percent over the previous season. An additional 15,700 coots were knocked down but not retrieved, yielding a total kill (bag plus cripples) of about 63,000 coots.

At the State level, 11 States registered increases in the total duck bag, whereas 6 States registered decreases. The kill in Georgia increased 137 percent over the previous season owing to an 84 percent increase in the number of active hunters and an increase in the mean kill of ducks per hunter (table D-19).

A total of approximately 211,100 waterfowl hunters were afield during a total of 1,275,900 hunter-days, registering increases of 11 and 10 percent, respectively, over the previous season.

## AGE RATIOS OF SOME IMPORTANT SPECIES OF DUCKS KILLED DURING 1963-64 HUNTING SEASON COMPARED WITH THOSE OF PRIOR YEARS

Data supplied by Glen Smart  
Division of Wildlife Research  
Bureau of Sport Fisheries and Wildlife

### Abstract

The ratio of immature to adult ducks in the hunting kill of mallards, black ducks, blue-winged teal, pintails, and wood ducks are presented for the years 1961 through 1963. There was a general increase in the 1963 age ratios of these species above those in 1962. Although Central Flyway mallard age ratios increased, they were lowest in the Nation for the third consecutive year. Of all the species discussed, blue-winged teal age ratios showed the largest continentwide increase. Except for mallards in the Pacific Flyway, age ratios in the kill of all species were higher in the northern parts of the Flyways.

To determine the age ratio in the pre-season population, it is necessary to use recovery rates from pre-season bandings to measure the extent to which immatures were more likely to be shot than adults. When the age ratio in the kill is adjusted

for difference in vulnerability, the age ratio in the pre-season continental mallard population was 0.8 immatures to adult in 1962 and 1.0 in 1963, while the age ratio in the 1963 pre-season pintail population was about 0.8 immatures to adult.

### Introduction

The age ratios (immature to adult) in the duck kill discussed here were determined from wings received in the wing collection surveys conducted in the Mississippi and Atlantic Flyways since 1960 and in all Flyways since 1961. In order to estimate the age ratio in the kill for a Flyway, or for the entire United States, the age ratio from each State was weighted in proportion to the kill in that State as derived from the results of the Bureau's mail questionnaire survey. Weighted age ratios for 1962 are subject to some revision since revised kill

estimates are contemplated for that year.

### Mallard age ratios

Age ratio of mallards killed in the Atlantic Flyway during the 1963-64 hunting season, showed a slight increase but is still substantially lower than the ratio obtained in 1960-61. The birds killed in Pennsylvania and other more northern States in the Atlantic Flyway showed a higher ratio of immature to adult (2.53) than did the States south of Pennsylvania (1.25).

The ratio of immature to adult mallards killed in the Mississippi Flyway during the 1963 hunting season (1.30) showed a slight decline from the ratio observed in 1962 (1.40), particularly in the northern part of the Flyway. Age ratios in the southern half of the Flyway tended to rise slightly or remained relatively unchanged.

Although steadily increasing since 1961, the Central Flyway mallard age ratio was still the lowest in the Nation for the third consecutive year. The observed ratio in the kill was 0.69 in 1961, compared with 0.94 in 1962 and 1.03 in 1963.

In the Central Flyway States of Montana, Wyoming, and Colorado, the wing survey data were segregated by counties east and west of the Continental Divide because those counties east of the Continental Divide were subject to regulations of the Central Flyway, and those counties west of the Divide were governed by Pacific Flyway regulations. New Mexico was not divided in this manner because the Continental Divide does not follow county lines.

In Montana the age ratio in 1963 was much higher west of the Divide than east. Conversely, in Wyoming and Colorado mallard age ratios west of the Divide were relatively low and only slightly higher than east of the Divide.

The mallard age ratio in the Pacific Flyway kill increased from 1.25 immatures to adult in 1962 to 1.62 in 1963. This represents a gain of 30 percent over 1962.

In the 3 years that wing collection survey data have been available for all Flyways, the continental weighted age ratio of mallards has shown a steady increase from 1.05 immatures to adult in 1961 to 1.36 immatures to adult in 1963 (table D-20).

In order to determine the age composition of the preseason population, it is necessary to correct the age ratios observed in the kill for the greater vulnerability of immatures to hunting. The preseason banding data presented in Administrative Report 46 were examined to determine the extent to which recovery rates from immatures taken in the United States exceeded recovery rates from adults. The recovery rates from each area were weighted in approximate proportion to the importance of the size of the population it represents and the Flyway or Flyways to which its recoveries relate. Although this approach should yield average relative recovery rates that are more representative than the unweighted averages presented in past reports, it places a great deal of weight on the meager and incomparable preseason bandings in the Prairie Provinces of Canada. In fact, preseason bandings in Canada in 1962 were so few that it was necessary to assume that the data from 1963 also reflected the characteristics of the kill in 1962. Thus, by giving each banding station equal weight, as has been necessary in the past owing to a lack of information from Canada, estimates of relative recovery rates may be biased. The 1963 preseason bandings in Canada for the first time were sufficient to illustrate the advisability of recognizing that mallards banded in Canada have different kill rate characteristics than those banded in the United States.

A study is in progress to develop appropriate weighting procedures, but the results are not yet available. A preliminary summation of the data indicates that in 1962 immatures were about 1.4 times more likely to be shot than adults and in 1963 they were 1.3 times more likely to be taken. It is believed that the

estimate of relative recovery rate in 1962 is too low because of inadequate and unrepresentative Canadian bandings that year. It is estimated, on the basis of banding stations in the United States (Administrative Report 46), that the actual relative recovery rate is probably between 1.4 and 1.8. If it is assumed that the actual rate is intermediate between these values (1, 6), the age composition of the mallard population was 0.8 immature to adult in 1962 and 1.0 immature to adult in 1963. This is a substantial improvement but it still does not reflect a production ratio characteristic of a rapid rate of increase in the population.

#### Black duck age ratios

The observed black duck age ratios in the Atlantic Flyway kill were higher in 1963 than in 1962. In 1962, there was an observed age ratio of 1.32 immatures to adult, while in 1963, it was 1.51. The highest age ratios were in the New England States and lowest in the southern part of the Flyway.

In the Mississippi Flyway, there was a continued decrease in the age ratio in the black duck kill. The ratios declined from a high of 2.04 in 1961, to the present low of 1.11 immatures to adult. There was a progressive decrease in age ratios from north to south among those States where estimates were made. The continental age ratio of black ducks showed little change from 1962 (table D-21).

Adequate preseason banding data are essential in order to interpret black duck age ratios in the kill. As pointed out in Administrative Report 27, there is a strong suggestion that the annual variation shown in the age composition of the kill in the past may have been caused by changes in differential vulnerability. Black duck preseason banding data are too meager to allow an estimate of the age composition of the population with any precision. Again, there is a suggestion that the improvement in the age ratio in the kill shown in the Atlantic Flyway was due, at least to some extent, to a change

in differential vulnerability. Comparable banding stations in this Flyway indicate that the relative recovery rate in 1963 was higher than that in 1962. Thus, the improved age ratios in the Atlantic Flyway may reflect increase in the likelihood of immatures being shot rather than improvement in the age composition of the preseason population.

#### Blue-winged teal age ratios

Because of the current interest in the blue-winged teal in the Mississippi and Central Flyways, only those two Flyways were tabulated. The other two Flyways were used only in the computation of weighted ratios for the entire United States.

In the Mississippi Flyway, the ratio of immature to adult blue-winged teal increased 90 percent from 1962 to 1963 (1.65 to 3.13). The ratio of immatures to adults increased 153 percent in Minnesota and 136 percent in Michigan.

Age ratios are shown for those States in the Central Flyway from which a sample of 20 or more wings were obtained. The Flyway weighted average increased from 2.11 in 1962 to 2.69 in 1963. The combined weighted age ratio for the Mississippi and Central Flyways increased from 1.24 in 1962 to 3.04 in 1963 (table D-22).

The blue-winged teal and cinnamon teal could not be separated by wing characters and were combined for the purpose of calculating a continental weighted age ratio. The 1963 observed ratio in the continental kill was 2.41 immatures to adult as compared with 1.40 for 1962. This represents an increase of 72 percent.

Despite the large number of blue-winged teal banded preseason in 1963, recovery rates were so low that harvest rates for immatures and adults could not be measured with sufficient precision to accurately determine the age composition of the preseason population. For example, the preseason banding data suggest that immatures were over four times more likely to be taken than adults. This implies an age ratio in the

preseason population of only 0.6 immature to adult, which is unreasonably low in view of apparent blue-winged teal population trends.

### Pintail age ratios

The pintail is a major game species only in the three western Flyways. Moderate increases were observed in all three Flyways. The greatest number of immatures to adult was found in the northern parts of all three Flyways. In California, where more pintails are harvested than in any other State, the age ratio in the kill was 1.1 immatures to adult in 1963, which was similar to the 1962 ratio of 1.0 (table D-23).

The continental weighted age ratio has increased steadily from 0.76 in 1961, to 1.29 in 1963 (an increase of 70 percent). Preseason banding data for pintails are extremely spotty. In California, they indicate that immature pintails were 1.5 times more likely to be taken in California than adults. This suggests that for this important area the age composition of the preseason population was only 0.7 immature to adult. South Dakota bandings

revealed that immatures were 1.75 times more likely to be taken than adults. This banding station relates to recoveries largely in the Central Flyway and indicates that the 1.4 immatures to adult age ratio observed in the Central Flyway kill represents a ratio of only 0.8 immature to adult in the preseason population.

### Wood duck age ratios

Wood duck age ratios showed an upward trend in 1963 (table D-24). The increase was greater in the Mississippi Flyway (1.25 in 1962 and 1.81 in 1963) than in the Atlantic Flyway (1.29 in 1962 and 1.48 in 1963).

The preseason banding program for wood duck is on a relatively larger scale than for any other species. The recovery rates indicate that in 1963 immatures were 1.2 times more likely to be taken than adults, while in 1962 the vulnerability ratio was 1.3 (Administrative Report 51). This suggests that the proportion of the preseason population consisting of immatures increased slightly more than indicated by the age composition in the kill.

## RESULTS OF GOOSE TAIL COLLECTION SURVEY, 1962 AND 1963 HUNTING SEASONS

Data supplied by Alfred J. Godin and Aelred D. Geis  
Division of Wildlife Research  
Bureau of Sport Fisheries and Wildlife

In 1962, a goose tail collection survey was inaugurated to measure the species and the age composition of the goose kill throughout the United States. Hunters indicating that they shot 1 or more geese in the previous year's mail questionnaire survey were sent 10 goose tail collection envelopes. In addition, to gain insight into the extent of the goose kill by other waterfowl hunters who had not reported geese the previous year, 1,970 Wisconsin duck hunters were sent supplies of goose tail collection envelopes in 1963. In 1962, a total of 7,459 hunters who were sent goose tail collection envelopes returned 5,250 tails, while in 1963, 9,724 hunters

sent 7,353 tails. The sample of duck hunters contacted in Wisconsin who had not shot a goose the previous year returned goose tails at 26 percent of the rate of previously successful goose hunters. This indicates that a significant goose kill is made by duck hunters who do not regularly take geese.

Species was determined from the color, size, and shape of the tail feathers. Preliminary data suggest that Canada geese may be further segregated into size groups and flocks based on tail measurements and/or the geographic area in which they were taken. For this report it is necessary to combine all Canada

goose data from a State. Age determinations were based on presence or absence of notched, blunt-tipped tail feathers. Data presented in this report are the result of pooling data from each State with no recognition of differences in sampling intensity that may exist among parts of a State. The information presented herein may be changed slightly when a more detailed analysis, recognizing variation within States, is completed. (Table D-25).

The Canada goose is the most important species in the bag in all States and Flyways, with the exception of South Dakota, Minnesota, Iowa, Louisiana, and Texas, where a combination of lesser snow and blue geese predominate, and New Jersey, where the brant is by far the most important goose in the bag.

### Goose age ratios

Canada goose age ratios showed no consistent trend (table D-26.) Lesser snow geese in all Central Flyway States showed a consistent increase in 1963 compared with 1962 in the ratio of immatures to adult, while in California there was little change. Blue goose age ratios showed no particular pattern of change. White-fronted goose age ratios in California were substantially lower in 1963 than 1962; a slight decline was suggested by the Texas sample. Black brant on the Pacific Coast showed a marked drop in the proportion of young birds in the bag in 1963 compared with 1962; brant on the Atlantic Coast showed a pronounced increase (table D-27).

**APPENDIX**

**A. WATERFOWL WINTER SURVEY TABLES**

**TABLE A-1. --Number of birds observed, North America extended,  
winter survey, 1964 and 1963**

| Species                   | 1964       | 1963       | Percent change | 14-year average | Percent change |
|---------------------------|------------|------------|----------------|-----------------|----------------|
| Ducks:                    |            |            |                |                 |                |
| Dabblers:                 |            |            |                |                 |                |
| Mallard -----             | 8,708,021  | 7,287,513  | + 19.5         | 7,407,947       | + 17.5         |
| Black duck -----          | 584,529    | 485,814    | + 20.3         | 545,631         | + 7.0          |
| Mottled duck -----        | 99,730     | 44,530     | +124           | 25,697          | +288.0         |
| Gadwall -----             | 1,356,374  | 633,550    | +114           | 547,877         | +147.0         |
| American widgeon --       | 2,031,017  | 1,785,239  | + 13.7         | 1,686,524       | + 20.4         |
| Green-winged teal --      | 2,268,464  | 1,262,229  | + 79.7         | 1,092,700       | +108.0         |
| Blue-winged teal --       | 778,927    | 402,275    | + 93.6         | 401,211         | + 94.0         |
| Cinnamon teal -----       | 7,730      | 4,969      | + 55.6         | --              | --             |
| Shoveler -----            | 832,953    | 849,347    | - 2.0          | 746,898         | + 11.5         |
| Pintail -----             | 4,694,530  | 3,586,231  | + 31.0         | 4,105,331       | + 14.3         |
| Wood duck -----           | --         | 60,268     | --             | --              | --             |
| Tree duck -----           | 70,692     | 73,259     | - 3.5          | 59,340          | + 19.0         |
| Subtotal -----            | 21,432,967 | 16,475,224 | + 30.0         | 16,727,729      | + 28.0         |
| Divers:                   |            |            |                |                 |                |
| Redhead -----             | 805,956    | 593,081    | + 35.9         | 708,987         | + 13.6         |
| Canvasback -----          | 336,866    | 330,329    | + 2            | 358,420         | - 6.0          |
| Scaup -----               | 1,998,206  | 3,049,403  | - 34.5         | 2,579,180       | - 22.6         |
| Ring-necked duck -----    | 341,734    | 286,755    | + 19.2         | 258,382         | + 32.2         |
| Goldeneye-----            | 188,432    | 205,119    | - 8.1          | 211,087         | - 10.8         |
| Bufflehead -----          | 65,184     | 79,494     | - 18           | 82,688          | - 21.2         |
| Ruddy duck -----          | 257,692    | 286,812    | - 10.2         | 264,719         | - 2.7          |
| Subtotal -----            | 3,994,070  | 4,830,993  |                | 4,463,463       |                |
| Miscellaneous:            |            |            |                |                 |                |
| Eider -----               | 63,900     | 117,167    | - 45.5         | 59,641          | + 7.1          |
| Scoter -----              | 118,375    | 187,007    | - 36.7         | 228,458         | - 48.2         |
| Oldsquaw -----            | 6,425      | 30,641     | - 79           | 29,159          | - 78.0         |
| Merganser -----           | 238,672    | 239,676    | - 0.4          | 226,051         | + 5.5          |
| Subtotal -----            | 427,372    | 574,491    |                | 543,309         |                |
| Unidentified -----        | 438,106    | 480,935    | - 8.9          | 528,391         | - 17.1         |
| Total ducks -----         | 26,292,515 | 22,361,643 | + 17.6         | 22,262,781      | + 18.1         |
| Geese:                    |            |            |                |                 |                |
| Snow goose -----          | 889,915    | 1,022,173  | - 13           | 912,563         | - 2.5          |
| Blue goose -----          | 411,521    | 373,180    | + 10.3         | 389,694         | + 5.6          |
| Ross' goose -----         | 32,450     | 25,253     | + 28.5         | 14,623          | +221.9         |
| White-fronted goose ----- | 270,964    | 219,382    | + 23.5         | 223,805         | + 21.0         |
| Canada goose-----         | 1,423,093  | 1,326,598  | + 7.3          | 1,179,220       | + 20.6         |
| Cackling goose -----      | 108,995    | 238,327    | - 54.3         | 219,478         | - 50.4         |
| Total geese -----         | 3,136,938  | 3,204,913  | - 2.1          | 2,941,255       | + 6.6          |
| Brant, Pacific -----      | 185,287    | 140,025    | + 32.3         |                 |                |
| Brant, Atlantic -----     | 182,900    | 167,405    | + 9.2          |                 |                |
| Total brant -----         | 368,187    | 307,430    |                |                 |                |
| Swans:                    |            |            |                |                 |                |
| Whistling swan -----      | 91,894     | 108,240    | - 15           | 93,628          | - 1.9          |
| Trumpeter swan -----      | 578        | 611        | - 5.4          | 807             | - 28.4         |
| Total swans -----         | 92,472     | 108,851    |                | 94,435          |                |
| Coots -----               | 2,636,814  | 1,810,243  | + 45.7         | 2,074,811       | + 27.0         |
| Grand total -----         | 32,526,926 | 27,793,080 | + 17           | 27,681,498      | + 17.5         |

TABLE A-2. --Number of birds observed, by species, Pacific Flyway extended, winter survey, 1963 and 1964

| Species                             | 1963       |         | 1964      |         | Percent change |
|-------------------------------------|------------|---------|-----------|---------|----------------|
|                                     | Number     | Percent | Number    | Percent |                |
| Ducks:                              |            |         |           |         |                |
| Dabblers:                           |            |         |           |         |                |
| Mallard -----                       | 2,642,011  | 26.3    | 2,060,859 | 21.6    | - 21.9         |
| Gadwall -----                       | 126,869    | 1.2     | 72,544    | 0.8     | - 42.8         |
| American widgeon --                 | 1,162,713  | 11.5    | 959,746   | 10.0    | - 17.4         |
| Green-winged teal --                | 418,703    | 4.1     | 637,971   | 6.7     | + 52.3         |
| Blue-winged and cinnamon teal ----- | 89,569     | 0.8     | 181,238   | 1.9     | +105.2         |
| Shoveler -----                      | 497,319    | 4.9     | 379,619   | 4.0     | - 24.6         |
| Pintail -----                       | 2,072,821  | 20.6    | 2,389,555 | 25.1    | + 15.2         |
| Wood duck -----                     | 1,185      | Trace   | 1,088     | Trace   | --             |
| Tree duck -----                     | 40,545     | 0.4     | 41,550    | 0.4     | + 2.5          |
| Subtotal -----                      | 7,051,735  | 69.8    | 6,724,170 | 70.5    | - 4.7          |
| Divers:                             |            |         |           |         |                |
| Redhead -----                       | 45,406     | 0.4     | 52,700    | 0.5     | + 16.0         |
| Canvasback -----                    | 100,824    | 1.0     | 80,778    | 0.8     | - 19.8         |
| Scaup -----                         | 437,285    | 4.3     | 279,919   | 2.9     | - 36.0         |
| Ring-necked duck -----              | 7,220      | Trace   | 9,891     | 0.1     | + 36.9         |
| Goldeneye-----                      | 59,953     | 0.5     | 59,285    | 0.6     | - 1.1          |
| Bufflehead -----                    | 34,438     | 1.9     | 25,911    | 0.3     | - 24.7         |
| Ruddy duck -----                    | 193,229    | 1.9     | 159,202   | 1.8     | - 17.6         |
| Subtotal -----                      | 878,355    | 8.4     | 667,686   | 7.0     | - 2.4          |
| Miscellaneous:                      |            |         |           |         |                |
| Eider and scoter -----              | 103,251    | 1.0     | 79,972    | 0.8     | - 22.5         |
| Oldsquaw -----                      | 300        | Trace   | 330       | Trace   | + 10.0         |
| Merganser -----                     | 36,074     | 0.3     | 24,567    | 0.3     | - 31.8         |
| Subtotal -----                      | 139,625    | 1.3     | 104,869   | 1.1     | - 24.9         |
| Unidentified -----                  | 92,768     | 0.9     | 75,285    | 0.7     |                |
| Total ducks -----                   | 8,162,483  | 82.2    | 7,572,010 | 79.5    | - 7.2          |
| Geese:                              |            |         |           |         |                |
| Snow goose -----                    | 482,911    | 4.8     | 453,891   | 4.8     | - 6.0          |
| Ross' goose -----                   | 25,253     | 0.2     | 32,450    | 0.3     | + 28.5         |
| White-fronted goose -----           | 128,566    | 1.3     | 171,756   | 1.7     | + 33.6         |
| Canada goose -----                  | 206,257    | 2.0     | 217,639   | 2.3     | + 5.5          |
| Cackling goose-----                 | 238,327    | 2.4     | 108,995   | 1.2     | - 54.3         |
| Total geese -----                   | 1,081,314  | 10.7    | 984,731   | 10.3    | - 9.0          |
| Black brant -----                   | 140,025    | 1.4     | 185,287   | 2.0     | + 35.9         |
| Swans:                              |            |         |           |         |                |
| Whistling swan -----                | 46,772     | 0.5     | 29,572    | 0.3     | - 36.8         |
| Trumpeter swan -----                | 170        | Trace   | 274       | Trace   | + 61.1         |
| Total swans -----                   | 46,942     | 0.5     | 29,846    | 0.3     | - 36.4         |
| Coots -----                         | 605,103    | 6.0     | 754,824   | 7.9     | + 24.7         |
| Grand total -----                   | 10,035,867 | 100.0   | 9,526,698 | 100.0   | - 5.1          |

TABLE A-3. --Distribution of wintering waterfowl,  
Pacific Flyway extended, 1963 and 1964

| [ Index numbers ]        |            |           |
|--------------------------|------------|-----------|
|                          | 1963       | 1964      |
| British Columbia -----   | 71,580     | --        |
| Washington -----         | 1,511,001  | 1,538,853 |
| Oregon -----             | 579,074    | 474,442   |
| California -----         | 5,069,655  | 4,813,514 |
| Idaho -----              | 1,071,281  | 516,783   |
| Nevada -----             | 45,923     | 173,084   |
| Utah -----               | 103,588    | 58,406    |
| Arizona -----            | 74,519     | 67,269    |
| Montana: West -----      | 33,294     | 38,240    |
| Colorado: West-----      | 6,805      | 14,872    |
| New Mexico: West-----    | 3,333      | 1,095     |
| Wyoming: West-----       | 3,210      | 8,405     |
| Mexico: West coast ----- | 1,462,604  | 1,821,735 |
| Total -----              | 10,035,867 | 9,526,698 |

TABLE A-4. --Trend in waterfowl numbers, Pacific Flyway extended,  
winter survey, 1949 to 1964

[In thousands]

| Year      | Ducks              | Geese              | Brant | Swans | Coots | Total  |
|-----------|--------------------|--------------------|-------|-------|-------|--------|
| 1949----- | 9,008              | 980                | 123   | 17    | 773   | 10,901 |
| 1950----- | 7,082              | 730                | 144   | 18    | 407   | 8,381  |
| 1951----- | 6,619              | 1,000 <sup>1</sup> | 151   | 33    | 769   | 8,572  |
| 1952----- | 6,646              | 917                | 167   | 20    | 520   | 8,270  |
| 1953----- | 7,352              | 952                | 154   | 29    | 796   | 9,283  |
| 1954----- | 7,813              | 884                | 132   | 28    | 1,169 | 10,026 |
| 1955----- | 7,288              | 872                | 135   | 36    | 717   | 9,048  |
| 1956----- | 7,929              | 961                | 110   | 48    | 885   | 9,933  |
| 1957----- | 6,593 <sup>2</sup> | 749                | 128   | 44    | 952   | 8,466  |
| 1958----- | 8,582              | 800                | 126   | 51    | 815   | 10,394 |
| 1959----- | 9,452              | 918                | 68    | 40    | 1,007 | 11,485 |
| 1960----- | 7,760              | 883                | 105   | 36    | 859   | 9,643  |
| 1961----- | 7,780              | 1,100              | 134   | 41    | 1,162 | 10,217 |
| 1962----- | 7,365              | 1,223              | 170   | 34    | 703   | 9,495  |
| 1963----- | 8,162              | 1,081              | 140   | 47    | 605   | 10,036 |
| 1964----- | 7,572              | 985                | 185   | 30    | 755   | 9,527  |

Note. --Coverage during the period was not comparable and the data were adjusted, using 1959 and 1955 as base years. It was assumed that areas where comparable surveys were conducted provided an accurate measure of the percentage change between 2 consecutive years. On this basis, population estimates were calculated backward and forward from the base years. The 1962 figures are based upon only observed birds and are not adjusted.

<sup>1</sup>Index arbitrarily reduced from 1,797,000 to 1 million geese. During January 1951, more geese were estimated to be in Merced County, California, than were in the entire Flyway either the previous or the following year. It seems certain that the estimate was in error. If the geese recorded in Merced County are deleted from the totals for 1950, 1951, and 1952, and a revised estimate is calculated based on change observed in the remaining areas, the index for 1951 is about 1 million birds.

<sup>2</sup>No surveys were conducted in Mexico in 1957. The data indicate that it is unlikely that surveys in the United States, Canada, and Alaska accurately revealed the trend in wintering populations of ducks that year.

TABLE A-5.--Number of birds observed, by species, Central Flyway extended, winter survey, 1963 and 1964

| Species                   | 1963      |         | 1964      |         | Percent change |
|---------------------------|-----------|---------|-----------|---------|----------------|
|                           | Number    | Percent | Number    | Percent |                |
| Ducks:                    |           |         |           |         |                |
| Dabblers:                 |           |         |           |         |                |
| Mallard -----             | 1,659,559 | 32.4    | 2,195,673 | 36.0    | + 39.5         |
| Black duck -----          | 2,948     | Trace   | 158       | Trace   | - 94.6         |
| Mottled duck -----        | 7,030     | 0.1     | 4,910     | Trace   | + 79.6         |
| Gadwall -----             | 95,565    | 1.8     | 121,249   | 2.0     | + 26.9         |
| American widgeon -----    | 252,100   | 4.9     | 334,264   | 5.5     | + 32.6         |
| Green-winged teal -----   | 223,500   | 4.4     | 257,836   | 4.2     | + 15.3         |
| Blue-winged and           |           |         |           |         |                |
| Cinnamon teal -----       | 60,855    | 1.2     | 165,988   | 2.7     | +172.6         |
| Shoveler -----            | 65,793    | 1.3     | 89,125    | 1.5     | + 34.0         |
| Pintail -----             | 602,685   | 11.8    | 784,520   | 12.8    | + 19.1         |
| Wood duck-----            | 1,251     | Trace   | 744       | Trace   | --             |
| Tree duck -----           | 32,714    | 0.6     | 29,142    | 0.5     | - 11.0         |
| Subtotal -----            | 3,004,000 | 58.7    | 3,981,609 | 65.2    | + 32.5         |
| Divers:                   |           |         |           |         |                |
| Redhead -----             | 395,044   | 7.7     | 297,938   | 4.9     | + 47.9         |
| Canvasback -----          | 21,382    | 0.4     | 24,700    | 0.4     | + 15.5         |
| Scaup -----               | 315,358   | 6.2     | 108,788   | 1.8     | - 65.3         |
| Ring-necked duck -----    | 36,593    | 0.7     | 37,461    | 0.6     | - 8.6          |
| Goldeneye-----            | 11,034    | 0.2     | 5,104     | 0.1     | + 54.3         |
| Bufflehead-----           | 5,833     | 0.1     | 3,861     | Trace   | - 24.4         |
| Ruddy duck -----          | 10,108    | 0.2     | 18,281    | 0.3     | + 74.0         |
| Subtotal -----            | 795,352   | 15.5    | 496,133   | 8.1     | --             |
| Miscellaneous:            |           |         |           |         |                |
| Eider and scoter -----    | --        | --      | 3         | --      | --             |
| Merganser -----           | 82,450    | 1.6     | 88,168    | 1.4     | + 9.7          |
| Subtotal -----            | 82,450    | 1.6     | 88,171    | 1.4     |                |
| Unidentified-----         | 139,538   | 2.7     | 263,408   | --      | + 4.5          |
| Total ducks -----         | 4,021,340 | 78.6    | 4,829,321 | 79.0    | + 20.0         |
| Geese:                    |           |         |           |         |                |
| Snow goose -----          | 405,309   | 7.9     | 288,497   | 4.7     | - 28.9         |
| Blue goose -----          | 20        | Trace   | 41,923    | 0.7     | +100.0         |
| White-fronted goose ----- | 58,666    | 1.1     | 68,898    | 1.1     | + 17.4         |
| Canada goose-----         | 201,573   | 3.9     | 251,812   | 4.1     | + 26.3         |
| Total geese -----         | 665,568   | 13.0    | 651,130   | 10.6    | - 1.8          |
| Swans:                    |           |         |           |         |                |
| Whistling swan-----       | 5         | Trace   | 15        | Trace   | --             |
| Trumpeter swan-----       | 258       | Trace   | 38        | Trace   | --             |
| Total swan -----          | 263       | Trace   | 53        | Trace   | --             |
| Coots-----                | 429,276   | 8.4     | 643,288   | 10.4    | + 49.8         |
| Grand total -----         | 5,116,447 | 100.0   | 6,105,792 | 100.0   | + 24.4         |

TABLE A-6.--Distribution of wintering waterfowl, Central Flyway extended, 1963 and 1964

[ Index numbers]

| Area              | 1963      | 1964      |
|-------------------|-----------|-----------|
| Montana -----     | 112,714   | 160,609   |
| North Dakota----- | 18,717    | 67,847    |
| South Dakota----- | 286,327   | 364,069   |
| Wyoming-----      | 55,047    | 55,062    |
| Nebraska-----     | 167,731   | 218,025   |
| Colorado-----     | 246,465   | 387,330   |
| Kansas-----       | 362,644   | 394,349   |
| New Mexico-----   | 195,678   | 119,593   |
| Oklahoma-----     | 264,778   | 307,595   |
| Texas-----        | 2,319,848 | 2,553,176 |
| Mexico:           |           |           |
| East coast-----   | 778,714   | 338,519   |
| Central-----      | 307,784   | 1,139,618 |
| Total -----       | 5,116,447 | 6,105,792 |

TABLE A-7.--Trend in waterfowl numbers, Central Flyway extended, winter survey, 1949 to 1964

[ In thousands]

| Year      | Ducks              | Geese | Coots            | Total |
|-----------|--------------------|-------|------------------|-------|
| 1949----- | 4,256              | 1,031 | 1,139            | 6,426 |
| 1950----- | 5,542              | 839   | 615              | 6,996 |
| 1951----- | 4,733              | 507   | 375              | 5,615 |
| 1952----- | 6,116              | 409   | 1,017            | 7,542 |
| 1953----- | 5,591              | 512   | 578              | 6,681 |
| 1954----- | 6,441              | 723   | 1,322            | 8,486 |
| 1955----- | 5,746              | 521   | 594              | 6,861 |
| 1956----- | 7,814 <sup>1</sup> | 693   | 1,025            | 9,532 |
| 1957----- | 4,248 <sup>1</sup> | 443   | 364 <sup>1</sup> | 5,055 |
| 1958----- | 8,202              | 567   | 812              | 9,581 |
| 1959----- | 7,233              | 425   | 691              | 8,349 |
| 1960----- | 4,240              | 501   | 536              | 5,277 |
| 1961----- | 4,447              | 461   | 788              | 5,696 |
| 1962----- | 3,434              | 407   | 643              | 4,484 |
| 1963----- | 4,021              | 665   | 429              | 5,166 |
| 1964----- | 5,071              | 654   | 643              | 6,369 |

See note to table A-4.

<sup>1</sup>No surveys were conducted in Mexico in 1957. The data indicate that it is unlikely that surveys in the United States alone accurately revealed the trend in wintering population for either ducks or coots that year.

TABLE A-8.--Number of birds observed, by species, Mississippi Flyway extended, winter survey, 1963 and 1964.

| Species                   | 1963      |         | 1964       |         | Percent change |
|---------------------------|-----------|---------|------------|---------|----------------|
|                           | Number    | Percent | Number     | Percent |                |
| Ducks:                    |           |         |            |         |                |
| Dabblers:                 |           |         |            |         |                |
| Mallard -----             | 2,733,263 | 31.5    | 4,069,648  | 32.2    | + 49.1         |
| Black duck -----          | 148,086   | 1.7     | 218,071    | 1.7     | + 47.2         |
| Mottled duck -----        | 32,100    | 0.4     | 82,200     | 0.7     | +156.1         |
| Gadwall -----             | 373,396   | 4.3     | 1,131,181  | 9.0     | +203.0         |
| American widgeon -----    | 255,816   | 2.9     | 614,445    | 4.9     | +140.2         |
| Green-winged teal -----   | 509,632   | 5.9     | 1,298,557  | 10.3    | +154.8         |
| Blue-winged teal -----    | 222,510   | 2.5     | 421,431    | 3.3     | + 89.4         |
| Shoveler -----            | 264,545   | 3.0     | 349,505    | 2.8     | + 32.1         |
| Pintail -----             | 729,025   | 8.4     | 1,416,393  | 11.2    | + 94.3         |
| Wood duck -----           | 38,602    | 0.4     | --         | --      | --             |
| Subtotal -----            | 5,306,975 | 61.1    | 9,601,431  | 76.1    | + 80.9         |
| Divers:                   |           |         |            |         |                |
| Redhead -----             | 22,055    | 0.2     | 26,073     | 0.3     | + 18.2         |
| Canvasback -----          | 44,073    | 0.5     | 41,388     | 0.4     | - 6.1          |
| Scaup -----               | 1,684,987 | 19.4    | 752,086    | 6.0     | - 55.1         |
| Ring-necked duck -----    | 108,632   | 1.2     | 129,865    | 1.0     | + 19.5         |
| Goldeneye -----           | 34,122    | 0.4     | 27,719     | 0.2     | - 18.7         |
| Bufflehead-----           | 2,311     | Trace   | 5,361      | Trace   | +132.0         |
| Ruddy duck -----          | 20,655    | 0.2     | 23,056     | 0.1     | + 11.6         |
| Subtotal -----            | 1,916,835 | 22.1    | 1,005,548  | 8.0     | - 47.5         |
| Miscellaneous:            |           |         |            |         |                |
| Eider and scoter -----    | 5         | Trace   | --         | --      | -100.0         |
| Oldsquaw -----            | 9,261     | 0.1     | 2,595      | Trace   | 72.0           |
| Merganser -----           | 65,207    | 0.7     | 98,829     | 0.9     | + 51.6         |
| Subtotal -----            | 74,473    | 0.8     | 101,424    | 0.8     | + 36.2         |
| Unidentified-----         | 14,801    | 0.2     | 154,875    | --      | --             |
| Total ducks-----          | 7,313,084 | 84.2    | 10,863,278 | 86.1    | + 48.6         |
| Geese:                    |           |         |            |         |                |
| Snow goose -----          | 69,033    | 0.8     | 87,827     | 0.8     | + 27.1         |
| Blue goose -----          | 373,040   | 4.3     | 369,098    | 2.9     | n/c            |
| White-fronted goose ----- | 32,150    | 0.4     | 30,310     | 0.2     | - 5.7          |
| Canada goose -----        | 437,952   | 5.0     | 422,513    | 3.3     | - 2.9          |
| Total geese-----          | 912,175   | 10.5    | 909,748    | 7.2     | - 0.3          |
| Swans:                    |           |         |            |         |                |
| Whistling swan-----       | 11        | --      | --         | --      | --             |
| Mute -----                | 183       | --      | --         | --      | --             |
| Total swans-----          | 194       | --      | --         | --      | --             |
| Coots -----               | 452,324   | 5.2     | 852,052    | 6.7     | + 88.4         |
| Grand total -----         | 8,677,777 | 100.0   | 12,625,078 | 100.0   | + 45.5         |

TABLE A-9.--Distribution of wintering waterfowl,  
Mississippi Flyway extended, 1963 and 1964  
[ Index numbers ]

| Area             | 1963      | 1964       |
|------------------|-----------|------------|
| Ontario-----     | 56,370    | --         |
| Minnesota-----   | 15,617    | 15,847     |
| Wisconsin-----   | 40,842    | 41,928     |
| Michigan-----    | 44,275    | 71,719     |
| Iowa-----        | 148,706   | 113,017    |
| Missouri-----    | 373,445   | 472,705    |
| Illinois-----    | 663,434   | 1,118,908  |
| Indiana-----     | 82,919    | 59,283     |
| Ohio-----        | 65,009    | 132,134    |
| Kentucky-----    | 111,220   | 104,300    |
| Arkansas-----    | 1,191,460 | 1,366,937  |
| Tennessee-----   | 302,510   | 535,200    |
| Louisiana-----   | 5,240,570 | 8,223,100  |
| Mississippi----- | 157,400   | 187,000    |
| Alabama-----     | 184,000   | 183,000    |
| Total -----      | 8,677,777 | 12,625,078 |

TABLE A-10.--Trend in waterfowl numbers, Mississippi  
Flyway extended, winter survey, 1949 to 1964

[ In thousands ]

| Year      | Ducks  | Geese | Coots | Total  |
|-----------|--------|-------|-------|--------|
| 1949----- | 4,164  | 680   | 265   | 5,109  |
| 1950----- | 2,842  | 601   | 211   | 3,654  |
| 1951----- | 5,640  | 625   | 251   | 6,516  |
| 1952----- | 3,961  | 559   | 404   | 4,924  |
| 1953----- | 5,240  | 664   | 100   | 6,004  |
| 1954----- | 5,403  | 783   | 123   | 6,309  |
| 1955----- | 5,344  | 680   | 132   | 6,156  |
| 1956----- | 7,460  | 768   | 137   | 8,365  |
| 1957----- | 7,716  | 737   | 187   | 8,640  |
| 1958----- | 6,759  | 750   | 295   | 7,804  |
| 1959----- | 6,890  | 711   | 288   | 7,889  |
| 1960----- | 6,684  | 767   | 434   | 7,885  |
| 1961----- | 7,802  | 902   | 524   | 9,228  |
| 1962----- | 6,677  | 729   | 569   | 7,975  |
| 1963----- | 7,313  | 912   | 452   | 8,678  |
| 1964----- | 10,863 | 910   | 852   | 12,625 |

See note to table A-4.

TABLE A-11.--Number of birds observed, by species, Atlantic Flyway extended, winter survey, 1963 and 1964

| Species                 | 1963      |         | 1964      |         | Percent change |
|-------------------------|-----------|---------|-----------|---------|----------------|
|                         | Number    | Percent | Number    | Percent |                |
| Ducks:                  |           |         |           |         |                |
| Dabblers:               |           |         |           |         |                |
| Mallard -----           | 252,680   | 6.4     | 261,900   | 6.5     | + 3.6          |
| Black duck -----        | 334,780   | 8.5     | 366,300   | 9.1     | + 9.4          |
| Mottled duck -----      | 5,400     | 0.1     | 4,900     | 0.1     | - 9.2          |
| Gadwall -----           | 37,720    | 0.5     | 31,400    | 0.8     | - 16.8         |
| American widgeon -----  | 114,610   | 2.9     | 122,500   | 3.1     | + 6.9          |
| Green-winged teal ----- | 110,394   | 2.8     | 74,100    | 1.9     | - 32.9         |
| Blue-winged teal -----  | 34,310    | 0.9     | 18,000    | 0.4     | - 47.5         |
| Shoveler -----          | 21,690    | 0.5     | 15,700    | 0.4     | - 27.6         |
| Pintail -----           | 181,700   | 4.6     | 170,700   | 4.3     | - 6.0          |
| Wood duck -----         | 19,230    | 0.4     | (1)       | --      | --             |
| Subtotal -----          | 1,112,514 | 28.1    | 1,065,500 | 26.6    | - 4.2          |
| Divers:                 |           |         |           |         |                |
| Redhead -----           | 130,576   | 3.3     | 142,800   | 3.6     | + 9.4          |
| Canvasback -----        | 164,050   | 4.1     | 190,000   | 4.7     | + 15.8         |
| Scaup -----             | 611,773   | 15.5    | 856,900   | 21.4    | + 40.1         |
| Ring-necked duck -----  | 134,310   | 3.4     | 168,500   | 4.2     | + 25.4         |
| Goldeneye -----         | 100,010   | 2.5     | 84,400    | 2.1     | - 15.6         |
| Bufflehead -----        | 36,912    | 0.9     | 29,500    | 0.7     | - 20.1         |
| Ruddy duck -----        | 62,820    | 1.6     | 57,100    | 1.4     | - 9.1          |
| Subtotal -----          | 1,240,451 | 31.3    | 1,529,200 | 38.1    | + 31.3         |
| Miscellaneous:          |           |         |           |         |                |
| Eider and scoter -----  | 200,918   | 5.1     | 102,300   | 2.7     |                |
| Oldsquaw -----          | 21,080    | 0.5     | 3,500     | Trace   | - 83.4         |
| Merganser -----         | 55,945    | 1.4     | 24,800    | 0.6     | - 55.7         |
| Subtotal -----          | 277,943   | 7.0     | 130,600   | 3.3     | - 53.0         |
| Unidentified -----      | 233,828   | 5.9     | 68,300    | --      | - 71.3         |
| Total ducks -----       | 2,864,736 | 72.4    | 2,793,600 | 69.6    | - 2.5          |
| Geese:                  |           |         |           |         |                |
| Snow goose -----        | 64,920    | 1.6     | 59,700    | 1.5     | - 8.0          |
| Blue goose -----        | 120       | Trace   | 500       | Trace   | +316.7         |
| Canada goose -----      | 480,816   | 12.1    | 528,200   | 13.2    | + 9.8          |
| Total geese -----       | 545,856   | 13.8    | 588,400   | 14.7    | + 7.8          |
| American brant -----    | 167,405   | 4.2     | 182,900   | 4.6     | + 9.2          |
| Whistling swan -----    | 61,452    | 1.5     | 62,300    | 1.6     | + 1.4          |
| Coots -----             | 323,540   | 8.1     | 386,600   | 9.6     | + 19.5         |
| Grand total -----       | 3,962,989 | 100.0   | 4,013,800 | 100.0   | + 1.2          |

<sup>1</sup>Wood duck included with unidentified.

TABLE A-12.--Distribution of wintering waterfowl, Atlantic Flyway extended, 1963 and 1964

| Area                        | 1963      | 1964      |
|-----------------------------|-----------|-----------|
| Newfoundland-----           | 76,752    | --        |
| Quebec -----                | 8,379     | --        |
| Maritime Provinces -----    | 18,164    | --        |
| Maine-----                  | 57,000    | 49,500    |
| New Hampshire -----         | 4,000     | 6,500     |
| Massachusetts -----         | 104,800   | 130,900   |
| Connecticut -----           | 53,000    | 60,200    |
| Rhode Island -----          | 27,500    | 30,800    |
| New York <sup>1</sup> ----- | 442,632   | 202,600   |
| New Jersey -----            | 256,000   | 308,100   |
| Pennsylvania -----          | 18,900    | 24,000    |
| Delaware -----              | 50,400    | 100,600   |
| Maryland -----              | 569,500   | 711,400   |
| Virginia -----              | 176,730   | 142,100   |
| West Virginia -----         | 11,800    | 13,800    |
| North Carolina -----        | 401,820   | 393,100   |
| South Carolina -----        | 777,400   | 620,500   |
| Georgia -----               | 50,912    | 66,400    |
| Florida-----                | 857,300   | 1,153,300 |
| West Indies -----           | --        | --        |
| Total -----                 | 3,962,989 | 4,013,800 |

<sup>1/</sup>Vermont included with New York.

TABLE A-13.--Trend in waterfowl numbers, Atlantic Flyway extended, winter survey, 1949 to 1964

| Year      | Ducks | Geese | Brant | Swans | Coots | Total |
|-----------|-------|-------|-------|-------|-------|-------|
| 1949----- | 2,685 | 365   | 75    | 42    | 863   | 4,030 |
| 1950----- | 2,757 | 349   | 77    | 31    | 661   | 3,875 |
| 1951----- | 3,314 | 334   | 114   | 34    | 560   | 4,356 |
| 1952----- | 3,904 | 344   | 104   | 36    | 540   | 4,928 |
| 1953----- | 4,670 | 552   | 155   | 56    | 1,403 | 6,836 |
| 1954----- | 3,879 | 396   | 245   | 53    | 352   | 4,925 |
| 1955----- | 4,344 | 567   | 184   | 90    | 616   | 5,801 |
| 1956----- | 3,892 | 549   | 164   | 39    | 852   | 5,496 |
| 1957----- | 2,862 | 403   | 162   | 40    | 649   | 4,116 |
| 1958----- | 2,271 | 366   | 211   | 28    | 394   | 3,270 |
| 1959----- | 2,278 | 339   | 217   | 28    | 311   | 3,173 |
| 1960----- | 2,365 | 449   | 238   | 41    | 315   | 3,408 |
| 1961----- | 2,566 | 613   | 265   | 61    | 331   | 3,836 |
| 1962----- | 2,384 | 469   | 125   | 39    | 230   | 3,247 |
| 1963----- | 2,865 | 546   | 167   | 61    | 324   | 3,963 |
| 1964----- | 2,793 | 588   | 183   | 62    | 387   | 4,014 |

See note to table A-4.

TABLE A-14.--Number of birds, by species, east coast  
of Mexico, winter survey, January 1964 and 1963

| Species                 | 1964      | 1963    |
|-------------------------|-----------|---------|
| Ducks:                  |           |         |
| Dabblers:               |           |         |
| Mallard -----           | 57        | 212     |
| Mottled duck -----      | 170       | 243     |
| Gadwall -----           | 68,054    | 21,753  |
| American widgeon -----  | 70,799    | 55,343  |
| Green-winged teal ----- | 30,798    | 18,086  |
| Blue-winged teal -----  | 136,337   | 49,736  |
| Shoveler -----          | 48,418    | 12,672  |
| Pintail -----           | 90,392    | 32,256  |
| Wood duck-----          | --        | 83      |
| Tree duck-----          | 29,142    | 32,644  |
| Subtotal -----          | 474,167   | 223,028 |
| Divers:                 |           |         |
| Redhead -----           | 49,153    | 43,879  |
| Canvasback-----         | 11,207    | 5,724   |
| Scaup -----             | 76,370    | 76,262  |
| Ring-necked duck -----  | 20,091    | 26,109  |
| Goldeneye-----          | --        | --      |
| Bufflehead-----         | 45        | 262     |
| Ruddy duck -----        | 10,560    | 782     |
| Subtotal -----          | 167,426   | 153,018 |
| Miscellaneous:          |           |         |
| Merganser -----         | 82        | 1,301   |
| Unidentified-----       | --        | 66,303  |
| Total ducks -----       | 641,675   | 443,650 |
| Geese:                  |           |         |
| Snow -----              | 6,850     | 3,140   |
| Blue-----               | --        |         |
| White-fronted -----     | 33,036    | 22,478  |
| Canada -----            | 7,806     | 8,187   |
| Total geese -----       | 47,692    | 33,805  |
| Swans:                  |           |         |
| Whistling -----         | 11        | --      |
| Trumpeter -----         | --        | --      |
| Coots -----             | 450,240   | 301,259 |
| Grand total-----        | 1,139,618 | 778,714 |

TABLE A-15.--Number of birds, by species, west coast of Mexico  
winter survey, January 1964 and 1963

| Species                 | 1964 <sup>1</sup> | 1963      |
|-------------------------|-------------------|-----------|
| Ducks:                  |                   |           |
| Dabblers:               |                   |           |
| Mallard -----           | --                | --        |
| Gadwall -----           | 18,070            | 41,155    |
| American widgeon -----  | 51,190            | 76,120    |
| Green-winged teal ----- | 206,800           | 133,325   |
| Blue-winged teal -----  | 173,530           | 84,600    |
| Shoveler -----          | 142,720           | 250,205   |
| Pintail -----           | 706,680           | 426,387   |
| Wood duck-----          | --                | --        |
| Tree duck-----          | 41,550            | 40,545    |
| Subtotal -----          | 1,340,540         | 1,052,337 |
| Divers:                 |                   |           |
| Redhead -----           | 27,970            | 27,775    |
| Canvasback -----        | 395               | 700       |
| Scaup -----             | 139,325           | 150,910   |
| Ring-necked duck -----  | --                | 1,300     |
| Goldeneye -----         | 1,150             | 85        |
| Bufflehead-----         | 850               | 95        |
| Ruddy duck -----        | 9,950             | 32,950    |
| Subtotal -----          | 179,640           | 213,815   |
| Miscellaneous:          |                   |           |
| Scoter -----            | --                | 2,000     |
| Merganser -----         | --                | 1,600     |
| Unidentified-----       | --                | 51        |
| Total ducks -----       | 1,520,180         | 1,269,803 |

<sup>1</sup> Includes only areas surveyed both years.

TABLE A-16.--Number of birds, by species, northern interior  
of Mexico, winter survey, January 1964 and 1963

| Species               | 1964    | 1963    |
|-----------------------|---------|---------|
| Ducks:                |         |         |
| Dabblers:             |         |         |
| Mallard -----         | 455     | 700     |
| Mexican duck-----     | 41      | 114     |
| Gadwall -----         | 460     | 1,637   |
| American widgeon ---  | 1,021   | 4,383   |
| Green-winged teal --- | 5,804   | 27,498  |
| Blue-winged teal ---  | 140     | 571     |
| Shoveler -----        | 2,911   | 22,470  |
| Pintail -----         | 11,536  | 23,706  |
| Wood duck-----        | --      | --      |
| Tree duck-----        | --      | --      |
| Subtotal -----        | 22,368  | 81,079  |
| Divers:               |         |         |
| Redhead -----         | 485     | 32      |
| Canvasback -----      | 237     | 2,128   |
| Scaup -----           | 60      | 44      |
| Ring-necked duck ---  | 390     | 652     |
| Goldeneye -----       | 35      | --      |
| Bufflehead-----       | 31      | 30      |
| Ruddy duck -----      | 610     | 3,095   |
| Subtotal -----        | 1,848   | 5,981   |
| Miscellaneous:        |         |         |
| Merganser -----       | 90      | 947     |
| Unidentified-----     | 56,994  | 31,020  |
| Total ducks -----     | 81,300  | 119,027 |
| Geese:                |         |         |
| Snow and Blue -----   | 22,285  | 44,400  |
| White-fronted -----   | 6,566   | 4,408   |
| Canada -----          | 75      | --      |
| Total geese -----     | 28,926  | 48,808  |
| Swans:                |         |         |
| Whistling -----       | --      | --      |
| Trumpeter -----       | --      | --      |
| Coots -----           | 20,215  | 11,349  |
| Grand total -----     | 130,441 | 179,184 |

TABLE A-17.--Number of birds, by species, southern interior of Mexico,  
winter survey, January 1964 and 1963

| Species                 | 1964    | 1963    |
|-------------------------|---------|---------|
| Ducks:                  |         |         |
| Dabblers:               |         |         |
| Mallard -----           | --      | --      |
| Mexican duck-----       | 7,679   | 2,820   |
| Gadwall -----           | 5,127   | 9,140   |
| American widgeon -----  | 3,291   | 12,720  |
| Green-winged teal ----- | 7,450   | 26,400  |
| Blue-winged teal -----  | 24,703  | 7,725   |
| Shoveler -----          | 11,009  | 2,965   |
| Pintail -----           | 55,124  | 40,560  |
| Wood duck-----          | --      | --      |
| Tree duck-----          | --      | 70      |
| Subtotal -----          | 114,383 | 102,400 |
| Divers:                 |         |         |
| Redhead -----           | 2,090   | --      |
| Canvasback -----        | 1,055   | 1,925   |
| Scaup -----             | 290     | 200     |
| Ring-necked duck -----  | 3,677   | 50      |
| Goldeneye -----         | --      | --      |
| Bufflehead-----         | 28      | 50      |
| Ruddy duck-----         | 100     | 825     |
| Subtotal -----          | 7,240   | 3,050   |
| Unidentified-----       | 49,730  | --      |
| Total ducks-----        | 171,353 | 105,450 |
| Geese:                  |         |         |
| Snow -----              | 800     | 950     |
| Blue-----               | --      | --      |
| White-frosted -----     | 1,450   | 1,400   |
| Canada-----             | --      | --      |
| Total geese-----        | 2,250   | 2,350   |
| Swans:                  |         |         |
| Whistling -----         | --      | --      |
| Trumpeter -----         | --      | --      |
| Coots-----              | 34,475  | 20,800  |
| Grand total -----       | 208,078 | 128,600 |

B. WATERFOWL BREEDING GROUND SURVEY TABLES

TABLE B-1. --Statistical summary, waterfowl breeding population survey, Alaska, 1963 and 1964

|                          | Stratum I | Stratum II | Total     |
|--------------------------|-----------|------------|-----------|
| Area (sq. mi.)-----      | 43,450    | 33,200     | 76,650    |
| Sample (sq. mi.):        |           |            |           |
| 1963-----                | 200       | 150        | 350       |
| 1964-----                | 202       | 182        | 384       |
| Population index:        |           |            |           |
| Ducks per sq. mi.:       |           |            |           |
| 1963-----                | 16.5      | 22.1       | 18.4      |
| 1964-----                | 17.4      | 18.7       | 17.9      |
| Total ducks:             |           |            |           |
| 1963-----                | 679,100   | 734,500    | 1,413,600 |
| 1964-----                | 753,930   | 621,800    | 1,375,730 |
| Game ducks: <sup>1</sup> |           |            |           |
| 1963-----                | 470,650   | 672,800    | 1,143,450 |
| 1964-----                | 533,530   | 666,020    | 1,199,550 |

<sup>1</sup>Excludes scoter, eider, oldsquaw, and merganser.

TABLE B-2.--Waterfowl breeding population index, by species and stratum, Alaska, 1963 and 1964

| Species               | Stratum I |         | Stratum II |         | Total     |           | Percent change |
|-----------------------|-----------|---------|------------|---------|-----------|-----------|----------------|
|                       | 1963      | 1964    | 1963       | 1964    | 1963      | 1964      |                |
| <b>Dabblers:</b>      |           |         |            |         |           |           |                |
| Mallard -----         | 24,450    | 20,350  | 58,700     | 46,640  | 83,150    | 66,990    | -20            |
| Gadwall -----         | --        | 750     | --         | --      | --        | 750       | --             |
| American widgeon --   | 6,800     | 12,050  | 19,800     | 23,630  | 26,600    | 35,680    | +34            |
| Green-winged teal --  | 1,600     | 3,000   | tr         | 7,460   | 1,600     | 10,460    | +554           |
| Shoveler -----        | 1,600     |         | 3,600      | 7,460   | 5,200     | 7,460     | +43            |
| Pintail -----         | 186,000   | 207,830 | 191,900    | 170,930 | 377,900   | 378,760   | no change      |
| Subtotal -----        | 220,450   | 243,980 | 274,000    | 256,120 | 494,450   | 500,100   | +4             |
| <b>Divers:</b>        |           |         |            |         |           |           |                |
| Canvasback-----       | --        | --      | 16,900     | 11,200  | 16,900    | 11,200    | -34            |
| Scaup -----           | 246,500   | 295,550 | 338,600    | 266,730 | 585,100   | 562,280   | -4             |
| Goldeneye-----        | 2,900     | 6,000   | 7,300      | 2,500   | 10,200    | 8,500     | -16            |
| Bufflehead-----       | 800       | 1,500   | 36,000     | 30,470  | 36,800    | 31,970    | -13            |
| Subtotal -----        | 250,200   | 303,050 | 398,900    | 310,900 | 649,000   | 613,950   | -5             |
| <b>Miscellaneous:</b> |           |         |            |         |           |           |                |
| Scoter -----          | 103,200   | 98,350  | 61,700     | 49,780  | 164,900   | 148,130   | -10            |
| Eider -----           | 10,850    | 19,600  | --         | --      | 10,850    | 19,600    | +80            |
| Oldsquaw -----        | 94,400    | 87,450  | tr         | 5,000   | 94,400    | 92,450    | -2             |
| Merganser -----       | --        | 1,500   | --         | --      | --        | 1,500     | --             |
| Subtotal -----        | 208,450   | 206,900 | 61,700     | 54,780  | 270,150   | 261,680   | -3             |
| Total -----           | 679,100   | 753,930 | 734,500    | 621,800 | 1,413,600 | 1,375,730 | -2             |

TABLE B-3.--Whistling swan breeding population indexes, Alaska, 1958 to 1964

|                          | 1958   | 1959   | 1960   | 1961   | 1962   | 1963   | 1964   |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|
| Area sampled (sq. mi.)-- | 640    | 644    | 604    | 648    | 492    | 468    | 414    |
| Number counted----       | 600    | 546    | 710    | 759    | 470    | 567    | 481    |
| Population indexes --    | 63,735 | 58,640 | 79,310 | 79,040 | 55,965 | 64,000 | 50,400 |

TABLE B-4. --Comparative brood counts from three study areas in interior Alaska 1962 to 1964

| Species              | Tetlin                |      |      | Yukon Flats           |      |      | Minto Lakes           |      |      |
|----------------------|-----------------------|------|------|-----------------------|------|------|-----------------------|------|------|
|                      | Number broods counted |      |      | Number broods counted |      |      | Number broods counted |      |      |
|                      | 1962                  | 1963 | 1964 | 1962                  | 1963 | 1964 | 1962                  | 1963 | 1964 |
| Pintail              | 18                    | 11   | 4    | 27                    | 50   | 17   | 56                    | 32   | 17   |
| Mallard              | 14                    | 23   | 2    | 15                    | 12   | 11   | 16                    | 27   | 4    |
| American<br>widgeon  | 18                    | 23   | 6    | 111                   | 85   | 40   | 48                    | 94   | 35   |
| Shoveler             | 1                     |      |      | 21                    | 17   | 7    | 18                    | 10   | 1    |
| Blue-winged teal     |                       | 1    |      |                       |      |      |                       |      |      |
| Green-winged<br>teal | 30                    | 27   | 19   | 32                    | 37   | 12   | 13                    | 24   | 10   |
| Scaup <sup>1</sup>   | 2                     | 11   | 2    | 9                     | 43   | 16   | 73                    | 90   | 36   |
| Canvasback           | 18                    | 14   | 2    | 22                    | 19   | 4    | 36                    | 4    | 1    |
| Goldeneye            | 4                     | 2    | 2    | 1                     | 1    | 2    | 1                     | 7    | 2    |
| Bufflehead           | 14                    | 8    | 4    | 3                     | 4    | 4    | 21                    | 15   | 8    |
| Scoter <sup>1</sup>  | 2                     | 3    |      | 3                     | 5    | 1    | 1                     |      |      |
| Unidentified         | 14                    | 3    | 8    | 3                     |      |      |                       |      |      |
| Total                | 135                   | 126  | 49   | 247                   | 273  | 114  | 283                   | 303  | 114  |

<sup>1</sup>Census too early for significant number of these species to have hatched except at Minto.

TABLE B-5. --Waterfowl breeding population index, in northern Alberta, northeastern British Columbia, Northwest Territories, and Yukon, 1964 and 1963  
 [ in thousands ]

| Species                 | Index for stratum-- |     |     |     |     |     |     |     |    |     | Total |       | Percent change from 1963 |      |
|-------------------------|---------------------|-----|-----|-----|-----|-----|-----|-----|----|-----|-------|-------|--------------------------|------|
|                         | 1.1                 | 1.2 | 2   | 3   | 4   | 5   | 6   | 7   | 8  | 9   | 10    | 1964  | 1963                     |      |
| Ducks:                  |                     |     |     |     |     |     |     |     |    |     |       |       |                          |      |
| Dabblers:               |                     |     |     |     |     |     |     |     |    |     |       |       |                          |      |
| Mallard -----           | 204                 | 156 | 48  | 85  | 17  | 82  | 13  | 21  | 2  | --  | Trace | 628   | 623                      | --   |
| Gadwall -----           | 9                   | --  | 1   | --  | --  | --  | --  | --  | -- | --  | --    | 10    | 5                        | +104 |
| American widgeon -----  | 59                  | 75  | 9   | 27  | 13  | 19  | 6   | 26  | 4  | 5   | 4     | 247   | 156                      | +57  |
| Green-winged teal ----- | 33                  | 77  | 3   | 22  | 4   | 26  | 2   | 4   | 1  | --  | 1     | 173   | 117                      | +48  |
| Blue-winged teal -----  | 44                  | 28  | 3   | --  | --  | 4   | --  | --  | -- | --  | --    | 79    | 53                       | +49  |
| Shoveler -----          | 42                  | 61  | 6   | 10  | 3   | 57  | 2   | 1   | -- | --  | Trace | 182   | 47                       | +286 |
| Pintail -----           | 42                  | 39  | 8   | 24  | 6   | 32  | 4   | 30  | 13 | 9   | 6     | 213   | 156                      | +36  |
| Subtotal -----          | 433                 | 436 | 78  | 168 | 43  | 220 | 27  | 82  | 20 | 14  | 11    | 1,532 | 1,157                    | +32  |
| Divers:                 |                     |     |     |     |     |     |     |     |    |     |       |       |                          |      |
| Redhead -----           | 30                  | 16  | 5   | --  | --  | --  | --  | --  | -- | --  | --    | 51    | 32                       | +55  |
| Canvasback-----         | 29                  | --  | 12  | 13  | --  | --  | --  | 4   | 1  | --  | --    | 59    | 67                       | -13  |
| Scaup -----             | 324                 | 152 | 7   | 351 | 163 | 28  | 83  | 371 | 38 | 46  | 24    | 1,587 | 1,539                    | +3   |
| Ring-necked duck-----   | 12                  | 7   | 1   | 22  | --  | 5   | 5   | 2   | -- | --  | --    | 54    | 46                       | +18  |
| Goldeneye-----          | 28                  | 4   | 8   | 25  | 1   | --  | --  | 2   | 1  | --  | --    | 69    | 13                       | +432 |
| Bufflehead-----         | 46                  | 59  | 6   | 16  | 3   | 14  | 6   | 2   | -- | --  | --    | 152   | 113                      | +33  |
| Ruddy duck-----         | 20                  | --  | 1   | --  | --  | --  | --  | --  | -- | --  | --    | 21    | 14                       | +43  |
| Subtotal -----          | 489                 | 238 | 40  | 427 | 167 | 47  | 94  | 381 | 40 | 46  | 24    | 1,893 | 1,824                    | +3   |
| Miscellaneous:          |                     |     |     |     |     |     |     |     |    |     |       |       |                          |      |
| Scoter and eider-----   | 54                  | 42  | 1   | 190 | 126 | --  | 4   | 410 | 26 | 25  | 20    | 898   | 602                      | +49  |
| Oldsquaw -----          | --                  | 3   | --  | 97  | 47  | --  | --  | 94  | 1  | 33  | 7     | 282   | 81                       | +247 |
| Merganser -----         | 22                  | 1   | 3   | 14  | 29  | 1   | --  | 12  | 2  | 1   | --    | 85    | 85                       | --   |
| Subtotal -----          | 76                  | 46  | 4   | 301 | 202 | 1   | 4   | 516 | 29 | 59  | 27    | 1,265 | 768                      | +65  |
| Total ducks-----        | 998                 | 720 | 122 | 896 | 412 | 268 | 125 | 979 | 89 | 119 | 62    | 4,690 | 3,749                    | +25  |
| Geese:                  |                     |     |     |     |     |     |     |     |    |     |       |       |                          |      |
| White-fronted -----     | --                  | --  | --  | --  | --  | --  | --  | --  | -- | 2   | 1     | 3     | 2                        | +50  |
| Canada -----            | 6                   | 3   | 1   | 2   | 6   | --  | --  | 3   | -- | --  | Trace | 21    | 60                       | -66  |
| Swans -----             | --                  | --  | --  | --  | --  | --  | --  | 9   | 2  | 7   | 1     | 19    | 32                       | -44  |
| Coots -----             | 21                  | --  | 2   | --  | --  | --  | --  | --  | -- | --  | --    | 23    | 25                       | -6   |
| Grand total-----        | 1,025               | 723 | 125 | 898 | 418 | 268 | 125 | 991 | 91 | 128 | 64    | 4,756 | 3,868                    |      |

TABLE B-6.--Aerial brood counts in Northwest Territories and Yukon,  
July and August 1964

| Strata and size                   | Number of broods |             |              | Total <sup>1</sup><br>broods | Single<br>adults | Pairs | Average size of broods |             |              | Groups<br>of<br>3 to 10 <sup>2</sup> | Percent<br>change<br>from<br>1961 |
|-----------------------------------|------------------|-------------|--------------|------------------------------|------------------|-------|------------------------|-------------|--------------|--------------------------------------|-----------------------------------|
|                                   | Class<br>I       | Class<br>II | Class<br>III |                              |                  |       | Class<br>I             | Class<br>II | Class<br>III |                                      |                                   |
| Stratum 2<br>(31.5 sq. mi.)-----  | 9                | 24          | 6            | 39                           | 75               | 31    | 4.0                    | 4.5         | 4.7          | 30                                   | -90                               |
| Stratum 3<br>(18 sq. mi.)-----    | --               | 20          | --           | 20                           | 8                | 9     | --                     | 6.4         | --           | 9                                    | +300                              |
| Stratum 4<br>(85.5 sq. mi.)-----  | 5                | 27          | 1            | 35                           | 22               | 14    | 6.0                    | 5.9         | 5.0          | 7                                    | +170                              |
| Stratum 6<br>(13.5 sq. mi.)-----  | 8                | 31          | 5            | 45                           | 4                | 4     | 8.0                    | 6.4         | 4.0          | 9                                    | +87                               |
| Stratum 7<br>(148.5 sq. mi.)----- | 38               | 103         | 9            | 153                          | 58               | 33    | 6.3                    | 4.0         | 5.1          | 37                                   | +84                               |
| Stratum 8<br>(27 sq. mi.)-----    | 12               | 32          | 5            | 51                           | 16               | 12    | 5.0                    | 5.8         | 6.2          | 16                                   | +325                              |
| Stratum 10<br>(36 sq. mi.)-----   | 9                | 66          | 2            | 81                           | 17               | 16    | 4.6                    | 5.2         | 4.5          | 20                                   | +100                              |
| Total<br>(360 sq. mi.)-----       | 81               | 303         | 28           | 424                          | 200              | 119   | 5.5                    | 5.8         | 5.0          | 128                                  | +68                               |

<sup>1</sup>Total greater than sum of classes with addition of unclassified.

<sup>2</sup>Possibly class III broods.

TABLE B-7.--Long-term trend in May and July pond indexes by strata,  
southern Alberta, May and July, 1955 to 1964

[Index numbers in thousands]

| Year                         | Stratum |     |     | Total |
|------------------------------|---------|-----|-----|-------|
|                              | A       | B   | C   |       |
| <b>May:</b>                  |         |     |     |       |
| 1954-----                    | 434     | 607 | 122 | 1,163 |
| 1955-----                    | 405     | 656 | 191 | 1,252 |
| 1956-----                    | 353     | 598 | 116 | 1,067 |
| 1957-----                    | 187     | 442 | 82  | 711   |
| 1958-----                    | 255     | 431 | 120 | 806   |
| 1959-----                    | 131     | 253 | 120 | 504   |
| 1960-----                    | 257     | 550 | 193 | 1,000 |
| 1961-----                    | 191     | 432 | 69  | 692   |
| 1962-----                    | 118     | 345 | 60  | 523   |
| 1963-----                    | 170     | 602 | 72  | 844   |
| 1964-----                    | 138     | 366 | 137 | 641   |
| Average, 1952-64-----        | 262     | 491 | 120 | 874   |
| Percent change, 1964 from -- |         |     |     |       |
| Average -----                | -47     | -25 | +14 | -27   |
| 1963-----                    | -19     | -39 | +90 | -24   |
| <b>July:</b>                 |         |     |     |       |
| 1954-----                    | 241     | 400 | 65  | 706   |
| 1955-----                    | 218     | 339 | 66  | 623   |
| 1956-----                    | 185     | 420 | 64  | 669   |
| 1957-----                    | 120     | 288 | 42  | 450   |
| 1958-----                    | 136     | 282 | 53  | 471   |
| 1959-----                    | 93      | 140 | 74  | 307   |
| 1960-----                    | 84      | 262 | 57  | 403   |
| 1961-----                    | 51      | 153 | 35  | 239   |
| 1962-----                    | 65      | 257 | 48  | 360   |
| 1963-----                    | 145     | 471 | 73  | 689   |
| 1964-----                    | 78      | 162 | 72  | 312   |
| Average, 1952-64-----        | 164     | 302 | 70  | 536   |
| Percent change, 1964 from -- |         |     |     |       |
| Average -----                | -52     | -46 | +2  | -42   |
| 1963-----                    | -46     | -66 | -2  | -55   |

TABLE B-8.--Waterfowl breeding population index, by species and stratum,  
southern Alberta, May, 1963 and 1964

[Index numbers in thousands]

| Species               | Stratum |       |     | Total <sup>1</sup> |       | Average<br>1952 to<br>1964 | Percent change<br>from-- |         |  |
|-----------------------|---------|-------|-----|--------------------|-------|----------------------------|--------------------------|---------|--|
|                       | A       | B     | C   | 1963               | 1964  |                            | 1963                     | Average |  |
| <b>Ducks:</b>         |         |       |     |                    |       |                            |                          |         |  |
| <b>Dabblers:</b>      |         |       |     |                    |       |                            |                          |         |  |
| Mallard -----         | 178     | 546   | 111 | 739                | 835   | 916                        | +3                       | -9      |  |
| Gadwall -----         | 25      | 67    | 8   | 85                 | 100   | 85                         | +18                      | +18     |  |
| American widgeon --   | 53      | 136   | 22  | 133                | 211   | 175                        | +59                      | +20     |  |
| Green-winged teal --  | 2       | 20    | 2   | 15                 | 24    | 39                         | +63                      | -38     |  |
| Blue-winged teal ---  | 24      | 82    | 6   | 60                 | 112   | 133                        | +87                      | -16     |  |
| Shoveler -----        | 59      | 120   | 30  | 188                | 209   | 175                        | +11                      | +19     |  |
| Pintail -----         | 121     | 62    | 95  | 348                | 278   | 569                        | -20                      | -51     |  |
| Subtotal -----        | 462     | 1,033 | 274 | 1,568              | 1,769 | 2,092                      | +13                      | -16     |  |
| <b>Divers:</b>        |         |       |     |                    |       |                            |                          |         |  |
| Redhead -----         | 7       | 34    | 3   | 38                 | 44    | 46                         | +17                      | -5      |  |
| Canvasback-----       | 8       | 45    | 3   | 49                 | 56    | 51                         | +13                      | +10     |  |
| Scaup -----           | 51      | 179   | 28  | 261                | 258   | 244                        | -1                       | +6      |  |
| Ring-necked duck --   | --      | --    | --  | Tr                 | Tr    | 1                          | --                       | --      |  |
| Goldeneye-----        | Tr      | Tr    | --  | --                 | --    | 3                          | --                       | --      |  |
| Bufflehead-----       | 1       | 14    | --  | 14                 | 15    | 18                         | +7                       | -14     |  |
| Ruddy duck -----      | 1       | 14    | 2   | 10                 | 17    | 19                         | +68                      | -10     |  |
| Subtotal -----        | 68      | 286   | 36  | 373                | 390   | 382                        | +5                       | +2      |  |
| <b>Miscellaneous:</b> |         |       |     |                    |       |                            |                          |         |  |
| Scoter -----          | Tr      | 32    | --  | 17                 | 32    | 35                         | +94                      | -9      |  |
| Total ducks -----     | 530     | 1,351 | 310 | 1,958              | 2,191 | 2,509                      | +12                      | -13     |  |
| <b>Geese:</b>         |         |       |     |                    |       |                            |                          |         |  |
| Canada goose-----     | 3       | --    | 3   | 2                  | 6     | 4 <sup>1</sup>             | --                       | --      |  |
| Coots -----           | 17      | 59    | 13  | 61                 | 89    | 87                         | +45                      | +1      |  |
| Grand total -----     | 550     | 1,410 | 326 | 2,021              | 2,286 | 2,600                      | +13                      | -12     |  |

<sup>1</sup>Two-year average 1963-1964.

TABLE B-9.--Lone drake index, southern Alberta,  
1955 to 1964

[Expressed as percentage of total drakes]

| Year      | Mallard | Pintails | Canvasback |
|-----------|---------|----------|------------|
| 1955----- | 77.30   | 81.16    | 67.37      |
| 1956----- | 84.60   | 85.09    | 63.12      |
| 1957----- | 92.03   | 88.82    | 81.60      |
| 1958----- | 85.80   | 84.34    | 75.47      |
| 1959----- | 70.66   | 73.26    | 42.84      |
| 1960----- | 84.92   | 82.02    | 72.04      |
| 1961----- | 77.10   | 74.22    | 63.89      |
| 1962----- | 82.39   | 83.98    | 54.32      |
| 1963----- | 85.44   | 85.44    | 81.27      |
| 1964----- | 74.94   | 88.28    | 51.10      |

TABLE B-10.--Waterfowl brood and late-nesting indexes, by stratum, compared with previous year and long-term averages, southern Alberta, July, 1963 and 1964

[Index numbers in thousands]

| Species                                     | For stratum-- |       |       | Total |       | Average<br>1956<br>1964 | Percent change<br>from-- |         |
|---|---------------|-------|-------|-------|-------|-------------------------|--------------------------|---------|
|   | A             | B     | C     | 1963  | 1964  |                         | 1963                     | Average |
| <b>Broods:</b>                              |               |       |       |       |       |                         |                          |         |
| Duck brood index -----                      | 33            | 142   | 14    | 202   | 189   | 234                     | -6                       | -19     |
| Average brood size <sup>1</sup> -----       | 6.1           | 6.3   | 5.6   | 6.2   | 6.2   | 5.9                     | No count                 | +5      |
| Coot brood index -----                      | 1             | 17    | Trace | 19    | 18    | 47                      | -5                       | -62     |
| <b>Late nesting index<sup>2</sup> -----</b> |               |       |       |       |       |                         |                          |         |
| Dabblers:                                   |               |       |       |       |       |                         |                          |         |
| Mallard -----                               | 1             | Trace | 2     | 2     | 3     | 4                       |                          |         |
| Gadwall -----                               | 1             | --    | Trace | 2     | 1     | 2                       |                          |         |
| American widgeon -----                      | --            | --    | 1     | Trace | 1     | .5                      |                          |         |
| Green-winged teal -----                     | Trace         | --    | --    | --    | --    | Trace                   |                          |         |
| Blue-winged teal -----                      | Trace         | --    | Trace | Trace | Trace | 1                       |                          |         |
| Shoveler -----                              | 1             | Trace | 1     | 1     | 2     | 1                       |                          |         |
| Pintail -----                               | Trace         | --    | Trace | Trace | Trace | .5                      |                          |         |
| Subtotal -----                              | 3             | Trace | 4     | 5     | 7     | 9                       | +40                      | -22     |
| Divers:                                     |               |       |       |       |       |                         |                          |         |
| Redhead -----                               | --            | --    | Trace | --    | Trace | Trace                   |                          |         |
| Canvasback -----                            | --            | --    | --    | --    | --    | Trace                   |                          |         |
| Scaup -----                                 | 1             | 1     | 1     | 1     | 3     | 7                       |                          |         |
| Ring-necked duck -----                      | --            | --    | --    | --    | --    | Trace                   |                          |         |
| Goldeneye -----                             | --            | --    | --    | --    | --    | Trace                   |                          |         |
| Bufflehead -----                            | --            | --    | --    | --    | --    | Trace                   |                          |         |
| Ruddy duck -----                            | Trace         | 1     | Trace | 2     | 1     | 3                       |                          |         |
| Subtotal -----                              | 1             | 2     | 1     | 3     | 4     | 10                      | +33                      | -60     |
| Total -----                                 | 4             | 2     | 5     | 8     | 11    | 19                      | +37                      | +42     |

<sup>1</sup>Class II and III broods only.

<sup>2</sup>As indicated by adult pairs and singles.

TABLE B-11.--Duck production index, Washington, 1963 and 1964

[ Includes young]

| Region or habitat                      | Index   |         | Percent change from--<br>1963 |
|--|---------|---------|-------------------------------|
|  | 1963    | 1964    |                               |
| Scabland and plateau potholes -----    | 217,000 | 150,000 | -31                           |
| Northeastern highlands -----           | 88,000  | 98,000  | +11                           |
| Irrigated areas -----                  | 98,000  | 107,000 | +9                            |
| Other eastern Washington habitat ----- | 15,000  | 12,000  | -23                           |
| Western Washington -----               | 44,000  | 40,000  | -8                            |
| Total -----                            | 462,000 | 407,000 | -12                           |

TABLE B-12.--Goose production index, Oregon, 1963 and 1964

| Transect                | Total broods |      | Total young |       |
|-------------------------|--------------|------|-------------|-------|
|                         | 1963         | 1964 | 1963        | 1964  |
| Klamath River -----     | 194          | 264  | 871         | 1,192 |
| Klamath Marsh -----     | 67           | 44   | 300         | 200   |
| Sprague River -----     | 20           | 43   | 90          | 193   |
| Alkali Lake -----       | 14           | 14   | 62          | 62    |
| Spring Lake-----        | 14           | 14   | 65          | 65    |
| Nuss Lake-----          | 16           | 30   | 71          | 137   |
| Agency Lake -----       | 22           | 48   | 97          | 216   |
| Wocus Bay -----         | 26           | 41   | 118         | 187   |
| Howard Bay-----         | 4            | 25   | 17          | 112   |
| Summer Lake -----       | 55           | 56   | 243         | 231   |
| N. Lake County -----    | 26           | 29   | 131         | 116   |
| Columbia River -----    | 11           | 2    | 48          | 9     |
| Wickiup Reservoir ----- | 10           | 20   | 36          | 81    |
| G. I. Ranch-----        | 4            | 9    | 15          | 35    |
| Malheur Refuge -----    | 278          | 333  | 1,250       | 1,500 |
| Total -----             | 761          | 972  | 3,414       | 4,336 |

TABLE B-13.--Duck production index, by areas, Oregon, 1963 and 1964

| Transect               | Square miles | Total broods |      | Total young |       |
|------------------------|--------------|--------------|------|-------------|-------|
|                        |              | 1963         | 1964 | 1963        | 1964  |
| Klamath Basin -----    | 26           | 117          | 233  | 770         | 1,447 |
| Summer Lake -----      | 1            | 114          | 113  | 939         | 862   |
| N. Lake County -----   | 4            | 35           | 42   | 274         | 306   |
| Umatilla County-----   | 4            | 15           | 17   | 93          | 83    |
| Jefferson County ----- | 1            | 12           | 4    | 68          | 22    |
| Wasco County -----     | 1            | 16           | 12   | 74          | 75    |
| Malheur County -----   | 45           | 90           | 76   | 524         | 498   |
| G. I. Ranch-----       | 1            | 21           | 5    | 162         | 54    |
| Total -----            | 83           | 420          | 502  | 2,904       | 3,347 |

TABLE B-14. --Duck production index, by species, Oregon, 1963 and 1964

[Comparative trends on 108.7 square miles]

| Species                             | Number of broods |      | Number of young |       |
|-------------------------------------|------------------|------|-----------------|-------|
|                                     | 1963             | 1964 | 1963            | 1964  |
| Ducks:                              |                  |      |                 |       |
| Dabblers:                           |                  |      |                 |       |
| Mallard -----                       | 165              | 184  | 1,068           | 1,188 |
| Gadwall -----                       | 67               | 62   | 551             | 508   |
| American widgeon -----              | 1                | 6    | 7               | 34    |
| Blue-winged teal <sup>1</sup> ----- | 110              | 115  | 718             | 831   |
| Shoveler -----                      | 4                | 5    | 25              | 30    |
| Wood duck -----                     | --               | 1    | --              | 3     |
| Pintail -----                       | 24               | 13   | 153             | 89    |
| Subtotal -----                      | 371              | 386  | 2,522           | 2,683 |
| Divers:                             |                  |      |                 |       |
| Redhead -----                       | 82               | 183  | 604             | 1,196 |
| Canvasback -----                    | 4                | 2    | 21              | 15    |
| Scaup -----                         | 6                | --   | 33              | --    |
| Ruddy duck -----                    | 102              | 45   | 559             | 269   |
| Subtotal -----                      | 194              | 230  | 1,217           | 1,480 |
| Miscellaneous:                      |                  |      |                 |       |
| Merganser -----                     | 3                | 2    | 33              | 12    |
| Unidentified-----                   | 6                | 11   | 38              | 54    |
| Total -----                         | 574              | 629  | 3,810           | 4,229 |

<sup>1</sup>Includes cinnamon teal.

TABLE B-15. -- Fall population index, by species and area, California, 1964

| Species                   | Sacramento Valley | Suisun Marsh | North San Joaquin Valley | South San Joaquin Valley | North-eastern California | Klamath Basin | Total   |
|---------------------------|-------------------|--------------|--------------------------|--------------------------|--------------------------|---------------|---------|
| Ducks:                    |                   |              |                          |                          |                          |               |         |
| Dabblers:                 |                   |              |                          |                          |                          |               |         |
| Mallard                   | 97,390            | 4,270        | 7,290                    | 3,120                    | 31,980                   | 12,440        | 156,490 |
| Gadwall                   | 800               | 2,260        | 1,760                    | 220                      | 6,630                    | 11,180        | 22,850  |
| Cinnamon teal             | 8,370             | 950          | 1,920                    | 660                      | 8,390                    | 3,990         | 24,280  |
| Shoveler                  | 180               | 120          | 380                      | --                       | 1,240                    | 1,240         | 3,160   |
| Pintail                   | 1,080             | 110          | 280                      | 110                      | 8,800                    | 7,150         | 17,530  |
| Subtotal                  | 107,820           | 7,710        | 11,630                   | 4,110                    | 57,040                   | 36,000        | 224,310 |
| Divers:                   |                   |              |                          |                          |                          |               |         |
| Redhead                   | 1,750             | 120          | 190                      | 140                      | 5,370                    | 12,620        | 20,190  |
| Scaup                     | --                | --           | --                       | --                       | 810                      | 8,060         | 8,870   |
| Ruddy duck                | --                | --           | 390                      | --                       | 1,330                    | 11,910        | 13,630  |
| Subtotal                  | 1,750             | 120          | 580                      | 140                      | 7,510                    | 32,590        | 42,690  |
| Miscellaneous             | --                | --           | 30                       | 40                       | 1,060                    | 13,340        | 14,470  |
| Total ducks               | 109,570           | 7,830        | 12,240                   | 4,290                    | 65,610                   | 81,930        | 281,470 |
| Canada goose <sup>1</sup> | --                | --           | --                       | --                       | 16,970                   | 6,610         | 23,580  |
| Coots                     | 121,640           | 1,110        | 18,390                   | 11,420                   | 13,140                   | 25,040        | 190,740 |

<sup>1</sup>Includes nonbreeding component.

TABLE B-16. --Nesting pair and fall population estimates, California, 1963 and 1964

| Species             | Nesting pairs |        | Fall population index <sup>1</sup> |         |
|---------------------|---------------|--------|------------------------------------|---------|
|                     | 1963          | 1964   | 1963                               | 1964    |
| Ducks:              |               |        |                                    |         |
| Dabblers:           |               |        |                                    |         |
| Mallard -----       | 29,490        | 34,680 | 137,740                            | 156,490 |
| Gadwall -----       | 5,300         | 3,410  | 25,840                             | 22,850  |
| Cinnamon teal ----- | 4,380         | 5,230  | 18,440                             | 24,280  |
| Shoveler -----      | 1,340         | 590    | 4,840                              | 3,160   |
| Pintail -----       | 5,690         | 4,500  | 22,810                             | 17,530  |
| Subtotal -----      | 46,200        | 48,410 | 209,670                            | 224,310 |
| Divers:             |               |        |                                    |         |
| Redhead -----       | 4,990         | 3,060  | 22,190                             | 20,190  |
| Scaup -----         | 640           | 1,430  | 3,820                              | 8,870   |
| Ruddy duck -----    | 2,250         | 2,440  | 10,730                             | 13,630  |
| Subtotal -----      | 7,880         | 6,930  | 36,740                             | 42,690  |
| Miscellaneous ----- | 3,280         | 2,560  | 16,550                             | 14,470  |
| Total ducks -----   | 57,360        | 57,900 | 262,960                            | 281,470 |
| Canada goose-----   | 2,410         | 1,540  | 25,710                             | 23,580  |
| Coots -----         | 26,980        | 39,350 | 131,110                            | 190,740 |

<sup>1</sup>Includes young and resident adults.

TABLE B-17. --Aerial breeding-pair count on key production areas, Nevada, 1963 and 1964

| Species             | 1963  | 1964  |
|---------------------|-------|-------|
| Ducks:              |       |       |
| Dabblers:           |       |       |
| Mallard -----       | 896   | 1,225 |
| Gadwall -----       | 631   | 745   |
| Cinnamon teal ----- | 808   | 1,184 |
| Shoveler -----      | 91    | 163   |
| Pintails -----      | 360   | 481   |
| Subtotal -----      | 2,786 | 3,798 |
| Divers:             |       |       |
| Redhead -----       | 1,242 | 1,450 |
| Canvasback -----    | 125   | 78    |
| Ruddy duck -----    | 268   | 1,066 |
| Subtotal -----      | 1,635 | 2,594 |
| Unidentified-----   | 75    | 245   |
| Total ducks -----   | 4,496 | 6,637 |
| Canada goose-----   | 457   | 527   |

TABLE B-18.--Waterfowl production index, by species, Nevada, 1963 and 1964

| Species                | 1963  | 1964  | Percent change from 1963 |
|------------------------|-------|-------|--------------------------|
| Ducks:                 |       |       |                          |
| Dabblers:              |       |       |                          |
| Mallard -----          | 729   | 1,014 | +39                      |
| Gadwall -----          | 523   | 923   | +76                      |
| American widgeon       | --    | --    | --                       |
| Green-winged teal----- | 63    | 35    | -44                      |
| Cinnamon teal -----    | 349   | 1,908 | +446                     |
| Shoveler -----         | 46    | 30    | -35                      |
| Pintail -----          | 349   | 835   | +139                     |
| Subtotal -----         | 2,059 | 4,745 | +130                     |
| Divers:                |       |       |                          |
| Redhead -----          | 689   | 1,209 | +75                      |
| Canvasback -----       | 170   | 125   | -26                      |
| Scaup -----            | 23    | --    | --                       |
| Ruddy duck -----       | 128   | 398   | +210                     |
| Subtotal -----         | 1,010 | 1,732 | +71                      |
| Total ducks -----      | 3,069 | 6,477 | +111                     |
| Canada goose-----      | 615   | 712   | +16                      |

TABLE B-19.--Duck numbers, aerial surveys, Utah, 1963 and 1964

|                                 | Route flown      |              |              |                    |                  |             |           |
|---------------------------------|------------------|--------------|--------------|--------------------|------------------|-------------|-----------|
|                                 | Box Elder County | Weber County | Davis County | Jordan River Clubs | Salt Lake County | Utah County | Total     |
| Area sampled (sq. mi.)-----     | 48.0             | 15.5         | 14.2         | 6.2                | 6.7              | 18.0        | 108.6     |
| Ducks:                          |                  |              |              |                    |                  |             |           |
| Number counted:                 |                  |              |              |                    |                  |             |           |
| 1963-----                       | 2,076            | 1,039        | 1,160        | 710                | 69               | 464         | 5,518     |
| 1964-----                       | 2,595            | 1,050        | 1,056        | 564                | 33               | 280         | 5,578     |
| Number per square mile:         |                  |              |              |                    |                  |             |           |
| 1963-----                       | 43.3             | 67.0         | 81.7         | 114.5              | 10.3             | 25.8        | 50.8      |
| 1964-----                       | 54.1             | 67.7         | 74.4         | 91.0               | 4.9              | 15.6        | 51.4      |
| Percent change, from 1963 ----- | +25              | --           | -10          | -20                | -52              | -40         | no change |

TABLE B-20.--Dike line breeding pair counts of waterfowl  
on four State refuges, Utah, 1963 and 1964

| Species                 | 1963  | 1964  |
|-------------------------|-------|-------|
| Ducks:                  |       |       |
| Dabblers:               |       |       |
| Mallard -----           | 783   | 920   |
| Gadwall -----           | 673   | 783   |
| American widgeon -----  | 6     | 27    |
| Green-winged teal ----- | 24    | 126   |
| Blue-winged teal-----   | 52    | 39    |
| Cinnamon teal -----     | 863   | 1,042 |
| Shoveler -----          | 635   | 676   |
| Pintail -----           | 528   | 564   |
| Subtotal -----          | 3,564 | 4,177 |
| Divers:                 |       |       |
| Redhead -----           | 1,590 | 1,819 |
| Canvasback -----        | 2     | 2     |
| Scaup -----             | 15    | 18    |
| Goldeneye -----         | --    | 1     |
| Bufflehead-----         | 1     | 2     |
| Ruddy duck -----        | 328   | 381   |
| Subtotal -----          | 1,936 | 2,223 |
| Total ducks -----       | 5,500 | 6,400 |
| Canada goose-----       | 187   | 155   |

TABLE B-21.--Species composition of breeding populations of waterfowl, Utah, 1963 and 1964

| Species                 | Northern area |          | Southern area |          |
|-------------------------|---------------|----------|---------------|----------|
|                         | 1963          | 1964     | 1963          | 1964     |
| Ducks:                  |               |          |               |          |
| Dabblers:               |               |          |               |          |
| Mallard -----           | 14.2          | 16.0     | 22.2          | 18.3     |
| Gadwall -----           | 12.0          | 11.6     | 10.8          | 13.7     |
| American widgeon -----  | 0.3           | 0.1      | 1.5           | 2.1      |
| Green-winged teal ----- | 0.5           | 0.6      | 2.0           | 11.5     |
| Blue-winged teal -----  | 1.0           | 0.7      | 0.9           | 0.8      |
| Shoveler -----          | 10.9          | 10.9     | 7.8           | 6.5      |
| Pintail -----           | 8.5           | 8.0      | 16.1          | 15.6     |
| Divers:                 |               |          |               |          |
| Redhead -----           | 31.3          | 29.4     | 17.1          | 14.1     |
| Canvasback -----        | 0.2           | (2 obs.) | (1 obs.)      | --       |
| Scaup -----             | 0.4           | 0.2      | 1.6           | 1.2      |
| Ring-necked duck -----  | --            | --       | --            | --       |
| Goldeneye -----         | --            | --       | --            | (1 obs.) |
| Bufflehead-----         | --            | --       | 0.2           | 0.1      |
| Ruddy duck -----        | 5.9           | 6.1      | 8.1           | 4.4      |
| Total -----             | 100.0         | 100.0    | 100.0         | 100.0    |

TABLE B-22. --Canada goose production index, Utah, 1963 and 1964

| Area                                | Number of broods |      | Number of young |       |
|-------------------------------------|------------------|------|-----------------|-------|
|                                     | 1963             | 1964 | 1953            | 1964  |
| Cutler Reservoir -----              | 26               | 5    | 147             | 20    |
| Public shooting grounds-----        | 32               | 15   | 161             | 58    |
| Bear River Refuge and vicinity----- | 446              | 308  | 2,167           | 1,369 |
| Ogden Bay Refuge-----               | 85               | 79   | 408             | 395   |
| Farmington Bay Refuge-----          | 65               | 54   | 341             | 252   |
| Scipio Reservoir -----              | 5                | 1    | 23              | 4     |
| Fool's Creek Reservoir-----         | Dry              |      | Dry             |       |
| Redmond Lake-----                   | 12               | 11   | 60              | 52    |
| Gunnison Reservoir-----             | 8                | 8    | 38              | 39    |
| Clear Lake Refuge-----              | 5                | 3    | 26              | 16    |
| Mona Reservoir-----                 | 2 <sup>1</sup>   | 10   | 10              | 36    |
| Wales Reservoir-----                | 18               | 13   | 76              | 70    |
| Rich Co. (Bear River)-----          | 91               | 110  | 422             | 463   |
| Kooshaeem Reservoir-----            | 5                | 7    | 21              | 26    |
| Bicknell Bottoms -----              | 9                | 9    | 38              | 43    |
| Total -----                         | 809              | 633  | 3,938           | 2,843 |

<sup>1</sup>Incomplete count.

**TABLE B-23. --Aerial counts, Canada goose breeding pairs and grouped birds, Idaho, 1963 and 1964**

| Area                                    | 1963         | 1964         |
|---|--------------|--------------|
| <b>Snake River drainage:</b>            |              |              |
| Farewell Bend to railroad bridge -----  | 1,351        | 1,748        |
| Payette River (mouth to Emmett) -----   | 477          | 318          |
| Strike Dam to American Falls Dam -----  | 222          | 231          |
| North Fork, including Island Park ----- | 451          | 419          |
| South Fork -----                        | 239          | 158          |
| Mud Lake - Camas Refuge area -----      | 210          | 186          |
| Gray's Lake area -----                  | 814          | 872          |
| Blackfoot Reservoir area -----          | 587          | 562          |
| <b>Subtotal -----</b>                   | <b>4,351</b> | <b>4,494</b> |
| <b>Bear River and drainage:</b>         |              |              |
| Dingle Marsh area -----                 | 2,225        | 1,605        |
| <b>Total -----</b>                      | <b>6,576</b> | <b>6,099</b> |

**TABLE B-24. --Canada goose production index,  
Idaho, 1963 and 1964**

| Nesting unit                     | 1963         | 1964         | Percent<br>change<br>from 1963 |
|----------------------------------|--------------|--------------|--------------------------------|
| <b>Southwestern Idaho:</b>       |              |              |                                |
| Homedale -----                   | 1,116        | 1,162        | +4                             |
| Payette River -----              | 711          | 577          | -19                            |
| <b>Southeastern Idaho:</b> ----- |              |              |                                |
| Blackfoot Reservoir -----        | 483          | 317          | -34                            |
| Island Park Reservoir -----      | 128          | 69           | -46                            |
| North Fork Snake River -----     | 149          | 51           | -65                            |
| North Lake -----                 | 33           | 81           | +145                           |
| <b>Total -----</b>               | <b>2,620</b> | <b>2,257</b> | <b>-14</b>                     |

TABLE B-25. --Number of broods, by species, observed on trend routes in southeastern Idaho, 1963 and 1964

| Species                           | 1963 | 1964 |
|-----------------------------------|------|------|
| Milner Canal:                     |      |      |
| Dabblers:                         |      |      |
| Mallard -----                     | 35   | 20   |
| Gadwall -----                     | 4    | 2    |
| American widgeon -----            | 9    | 6    |
| Green-winged teal -----           | 7    | 3    |
| Blue-winged & cinnamon teal ----- | 3    | 2    |
| Pintail -----                     | 2    | --   |
| Subtotal -----                    | 60   | 33   |
| Divers:                           |      |      |
| Redhead -----                     | --   | --   |
| Subtotal-----                     |      |      |
| Unidentified -----                | --   | --   |
| Total -----                       | 60   | 33   |
| Blackfoot Reservoir:              |      |      |
| Dabblers:                         |      |      |
| Mallard -----                     | 49   | 15   |
| Gadwall -----                     | 76   | 56   |
| American widgeon -----            | 24   | 29   |
| Green-winged teal -----           | 1    | 1    |
| Blue-winged & cinnamon teal ----- | --   | 1    |
| Pintail -----                     | 6    | 12   |
| Shoveler-----                     | --   | --   |
| Subtotal-----                     | 156  | 114  |
| Divers:                           |      |      |
| Redhead -----                     | 1    | 2    |
| Canvasback-----                   | --   | --   |
| Lesser scaup -----                | 3    | 1    |
| Ruddy duck -----                  | --   | --   |
| Subtotal-----                     | 4    | 3    |
| Unidentified -----                | 1    | --   |
| Total -----                       | 161  | 117  |

TABLE B-26. --May and July pond indexes by strata and comparisons with average and previous year, southern Saskatchewan, 1956 to 1964

| Year                                    | Stratum |        |        |        |        | Total   |
|---|---------|--------|--------|--------|--------|---------|
|   | A-East  | A-West | B-East | B-West | C      |         |
| <b>May:</b>                             |         |        |        |        |        |         |
| 1956-----                               | 754.4   | 700.3  | 644.8  | 284.2  | 105.8  | 2,489.5 |
| 1957-----                               | 292.3   | 357.9  | 576.2  | 148.5  | 72.2   | 1,447.1 |
| 1958-----                               | 526.5   | 350.5  | 498.6  | 191.0  | 105.1  | 1,671.7 |
| 1959-----                               | 157.7   | 334.5  | 160.2  | 57.4   | 73.6   | 783.4   |
| 1960-----                               | 479.2   | 987.4  | 377.3  | 164.3  | 90.1   | 2,098.3 |
| 1961-----                               | 48.7    | 171.1  | 221.4  | 92.0   | 55.7   | 588.9   |
| 1962-----                               | 153.2   | 336.3  | 635.4  | 173.3  | 49.1   | 1,347.3 |
| 1963-----                               | 239.4   | 256.0  | 293.9  | 131.6  | 39.5   | 960.4   |
| 1964-----                               | 508.1   | 202.1  | 325.9  | 114.9  | 37.7   | 1,188.7 |
| Average 1956 to 1964--                  | 344.6   | 462.6  | 444.8  | 158.7  | 78.8   | 1,489.5 |
| Percent change, 1964<br>from 1963 ----- | +56.3   | -23.9  | -53.7  | -24.1  | -19.6  | -28.7   |
| Average -----                           | -30.5   | -44.7  | -33.9  | -17.1  | -49.9  | -35.5   |
| <b>July:</b>                            |         |        |        |        |        |         |
| 1958-----                               | 212.8   | 141.8  | 267.4  | 107.1  | 33.8   | 762.9   |
| 1959-----                               | 143.0   | 120.5  | 145.0  | 36.8   | 26.0   | 471.3   |
| 1960-----                               | 212.4   | 265.2  | 318.1  | 88.0   | 32.7   | 916.4   |
| 1961-----                               | 34.4    | 50.6   | 61.2   | 37.1   | 9.8    | 193.1   |
| 1962-----                               | 75.7    | 61.8   | 68.6   | 26.3   | 13.3   | 245.7   |
| 1963-----                               | 173.8   | 227.4  | 161.8  | 84.5   | 41.6   | 689.1   |
| Average 1958 to 1964--                  | 135.7   | 128.0  | 172.1  | 59.1   | 23.1   | 517.9   |
| Percent change, 1964<br>from 1963 ----- | +129.6  | +268.0 | +135.9 | +221.3 | +212.8 | +180.5  |
| Average -----                           | +28.1   | +77.7  | -6.0   | +43.0  | +80.1  | +33.1   |

TABLE B-27. --Waterfowl breeding population index, by species and stratum,  
southern Saskatchewan, May 1963 and 1964

[Index numbers in thousands]

| Species               | Stratum |        |        |        |       | Total   |         | Average<br>1956 to<br>1963 | Percent change<br>from : |         |
|-----------------------|---------|--------|--------|--------|-------|---------|---------|----------------------------|--------------------------|---------|
|                       | A-East  | A-West | B-East | B-West | C     | 1963    | 1964    |                            | 1963                     | Average |
|                       |         |        |        |        |       |         |         |                            |                          |         |
| <b>Ducks:</b>         |         |        |        |        |       |         |         |                            |                          |         |
| Dabblers:             |         |        |        |        |       |         |         |                            |                          |         |
| Mallard -----         | 115.1   | 198.1  | 195.7  | 122.1  | 40.4  | 774.4   | 671.4   | 1,655.7                    | -13.3                    | -59.5   |
| Black duck -----      | --      | --     | --     | --     | --    | --      | --      | 0.1                        | --                       | --      |
| Gadwall -----         | 12.6    | 58.9   | 30.4   | 34.4   | 25.3  | 103.0   | 161.6   | 77.0                       | +56.9                    | +109.9  |
| American widgeon --   | 13.1    | 23.0   | 21.4   | 25.6   | 5.7   | 73.0    | 88.8    | 160.5                      | +21.6                    | -44.7   |
| Green-winged teal --  | 0.2     | 1.8    | 1.2    | 4.6    | --    | 9.1     | 7.8     | 24.0                       | -14.3                    | -67.5   |
| Blue-winged teal --   | 27.3    | 50.9   | 26.1   | 14.1   | 7.1   | 59.0    | 125.5   | 168.9                      | +112.7                   | +25.7   |
| Shoveler -----        | 23.6    | 55.1   | 50.3   | 42.3   | 6.1   | 101.4   | 177.4   | 194.6                      | +75.0                    | +8.8    |
| Pintail-----          | 46.4    | 88.4   | 60.6   | 39.5   | 19.6  | 257.7   | 254.5   | 676.4                      | -1.2                     | -62.4   |
| Wood duck -----       | --      | --     | --     | --     | --    |         |         |                            |                          |         |
| Subtotal -----        | 238.3   | 476.2  | 385.7  | 282.6  | 104.2 | 1,377.6 | 1,487.0 | 2,957.3                    | +7.9                     | -49.7   |
| Divers:               |         |        |        |        |       |         |         |                            |                          |         |
| Redhead-----          | 3.7     | 7.1    | 13.8   | 7.0    | --    | 14.0    | 31.6    | 63.3                       | +125.7                   | -50.1   |
| Canvasback -----      | 7.4     | 11.1   | 23.2   | 15.4   | 0.4   | 52.4    | 57.5    | 116.7                      | +9.7                     | -50.7   |
| Scaup -----           | 18.9    | 9.0    | 13.8   | 22.5   | 0.6   | 58.3    | 64.8    | 220.4                      | +11.2                    | -70.6   |
| Ring-necked duck --   | 0.3     | 1.3    | 6.6    | 1.6    | 0.6   | 5.7     | 10.4    | 7.8                        | +82.5                    | +33.3   |
| Goldeneye -----       | 0.3     | --     | 0.6    | 0.3    | --    | 1.6     | 1.2     | 6.1                        | -25.0                    | -80.3   |
| Bufflehead -----      | 0.6     | --     | 2.7    | 5.8    | --    | 10.0    | 9.1     | 10.3                       | -9.0                     | -11.7   |
| Ruddy duck-----       | 0.3     | 1.3    | 3.7    | 4.7    | --    | 9.9     | 10.0    | 37.3                       | +1.0                     | -73.2   |
| Subtotal -----        | 31.5    | 29.8   | 64.4   | 57.3   | 1.6   | 151.9   | 184.6   | 462.0                      | +21.5                    | -60.1   |
| <b>Miscellaneous:</b> |         |        |        |        |       |         |         |                            |                          |         |
| Merganser -----       | 0.2     | --     | 1.2    | --     | --    | 5.4     | 1.4     | 2.7                        | -74.1                    | -48.2   |
| Scoter -----          | --      | --     | 3.9    | 4.3    | --    | 4.3     | 8.2     | 6.0                        | +90.7                    | +36.7   |
| Subtotal -----        | 0.2     | --     | 5.1    | 4.3    | --    | 9.7     | 9.6     | 8.6                        | -1.0                     | +11.6   |
| Total ducks -----     | 270.0   | 506.0  | 455.2  | 344.2  | 105.8 | 1,539.2 | 1,681.2 | 3,427.9                    | +9.2                     | -51.0   |
| <b>Geese:</b>         |         |        |        |        |       |         |         |                            |                          |         |
| Canada goose -----    |         | 0.5    | 1.6    | 0.2    | 0.9   | 3.6     | 3.2     | 1.6                        | -11.1                    | +100.0  |
| Coots -----           | 16.1    | 6.3    | 9.0    | 8.9    | 2.9   | 26.2    | 43.2    | 179.7                      | +64.9                    | -76.0   |
| Grand total -----     | 286.1   | 512.8  | 465.8  | 353.3  | 109.6 | 1,569.0 | 1,727.6 | 3,609.2                    | +10.1                    | -52.1   |

TABLE B-28. --Lone Drake index, southern Saskatchewan, 1956 to 1964

[Expressed as percentage of total drakes]

| Year       | Percent of Lone Drakes <sup>1</sup> |
|------------|-------------------------------------|
| 1956 ----- | 78.5                                |
| 1957 ----- | 80.7                                |
| 1958 ----- | 80.2                                |
| 1959 ----- | 73.0                                |
| 1960 ----- | 84.7                                |
| 1961 ----- | 71.9                                |
| 1962 ----- | 47.3                                |
| 1963 ----- | 82.6                                |
| 1964 ----- | 83.5                                |

<sup>1</sup> Includes only mallard, pintail, and canvas-back

TABLE B-29. --Waterfowl brood and late-nesting indexes by stratum compared with previous year and long-term average, southern Saskatchewan, 1963 and 1964

[Index numbers in thousands]

| Species                                | Stratum |        |        |        |     | Total |      | Average<br>1958 to<br>1963 | Percent change<br>from: |         |
|--|---------|--------|--------|--------|-----|-------|------|----------------------------|-------------------------|---------|
|  | A-East  | A-West | B-East | B-West | C:  | 1963  | 1964 |                            | 1963                    | Average |
| <b>Broods:</b>                         |         |        |        |        |     |       |      |                            |                         |         |
| Duckbrood index-----                   | 10.6    | 14.9   | 19.9   | 18.7   | 2.8 | 45.8  | 66.9 | 231.7 <sup>3</sup>         | +46.1                   | -71.1   |
| Average brood size <sup>1</sup> -----  | 5.9     | 5.2    | 5.6    | 6.1    | 6.0 | 5.4   | 5.7  | 5.1 <sup>3</sup>           | +5.6                    | +11.8   |
| Coot brood index -----                 | 1.8     | 2.1    | 3.9    | 1.4    | 0.0 | 5.2   | 9.2  | 37.6 <sup>3</sup>          | +76.9                   | -75.5   |
| <b>Late-nesting index<sup>2</sup>:</b> |         |        |        |        |     |       |      |                            |                         |         |
| <b>Dabblers:</b>                       |         |        |        |        |     |       |      |                            |                         |         |
| Mallard -----                          | 3.5     | 7.4    | 2.7    | 4.5    | 1.6 | 23.1  | 19.7 | 43.3                       | -14.7                   | -54.6   |
| Gadwall -----                          | 0.4     | 2.2    | 1.2    |        |     | 9.7   | 3.8  | 6.5                        | -60.8                   | -41.5   |
| American widgeon-----                  | 0.2     | 0.1    |        |        |     | 3.5   | 0.3  | 6.1                        | -91.4                   | -95.1   |
| Green-winged teal-----                 |         |        |        |        |     | 0.9   |      | 0.6                        |                         |         |
| Blue-winged teal -----                 | 1.6     | 3.7    |        |        |     | 8.1   | 5.3  | 12.7                       | -34.6                   | -58.3   |
| Shoveler -----                         | 0.4     | 1.1    |        |        |     | 3.1   | 1.5  | 3.2                        | -51.6                   | -53.1   |
| Pintail -----                          | 0.4     | 0.8    |        |        |     | 6.5   | 1.2  | 5.8                        | -81.5                   | -79.3   |
| Subtotal -----                         | 6.5     | 15.3   | 3.9    | 4.5    | 1.6 | 54.9  | 31.8 | 78.2                       | -42.1                   | -59.3   |
| <b>Divers:</b>                         |         |        |        |        |     |       |      |                            |                         |         |
| Redhead -----                          |         | 1.3    |        |        |     | 1.6   | 1.3  | 1.5                        | -18.8                   | -13.3   |
| Canvasback -----                       |         |        | 0.8    |        |     | 0.6   | 0.8  | 1.3                        | +33.3                   | -38.5   |
| Scaup -----                            | 1.9     | 0.4    | 6.6    |        |     | 2.8   | 8.9  | 6.6                        | +217.9                  | +34.9   |
| Ring-necked duck -----                 |         | 0.1    |        |        |     | 2.3   | 0.1  | 1.1                        | -95.7                   | -90.9   |
| Goldeneye -----                        | 0.2     |        |        |        |     |       | 0.2  | 0.3                        |                         | -33.3   |
| Bufflehead -----                       |         | 0.8    |        |        |     |       | 0.8  | 0.2                        |                         | +300.0  |
| Ruddy duck -----                       | 0.9     | 0.4    | 1.9    | 1.0    |     | 4.0   | 4.2  | 5.9                        | +5.0                    | -28.8   |
| Subtotal -----                         | 3.0     | 2.2    | 10.1   | 1.0    | 0.0 | 11.3  | 16.3 | 16.9                       | +44.3                   | -3.6    |
| Miscellaneous ducks -----              | --      | --     | --     | --     | --  | 1.4   | 0    | 0.7                        | --                      | --      |
| Total -----                            | 9.5     | 17.5   | 14.0   | 5.5    | 1.6 | 67.6  | 48.1 | 95.8                       | -28.9                   | -49.8   |

<sup>1</sup> Class II and III broods only.

<sup>2</sup> As indicated by adult pairs and singles.

<sup>3</sup> 11-year average - 1952 to 1962.

TABLE B-30.--Number of water areas per square mile, Montana, 1959 to 1964

|                                | Sheridan<br>County | Hi-Line |         | Great Falls-<br>Piedmont |
|--------------------------------|--------------------|---------|---------|--------------------------|
|                                |                    | Eastern | Central |                          |
| <b>Reservoirs:</b>             |                    |         |         |                          |
| 1959 -----                     | 0.43               | 0.64    | 1.10    | 1.22                     |
| 1960 -----                     | .35                | .51     | .91     | 1.79                     |
| 1961 -----                     | .27                | .55     | 1.09    | .83                      |
| 1962 -----                     | .24                | .59     | 1.09    | 1.11                     |
| 1963 -----                     | .29                | .72     | 1.13    | .73                      |
| 1964 -----                     | .51                | .57     | .62     | 1.11                     |
| <b>Potholes:</b>               |                    |         |         |                          |
| 1959 -----                     | 2.64               | .34     | 2.21    | 1.44                     |
| 1960 -----                     | 9.09               | 1.10    | 3.19    | 1.14                     |
| 1961 -----                     | 4.40               | .43     | .22     | .52                      |
| 1962 -----                     | 3.04               | .63     | 1.64    | .30                      |
| 1963 -----                     | 7.76               | 1.81    | .95     | .15                      |
| 1964 -----                     | 6.37               | .41     | .95     | 1.15                     |
| <b>Other water areas:</b>      |                    |         |         |                          |
| 1959 -----                     | .43                | .88     | .73     | 1.04                     |
| 1960 -----                     | .59                | 1.18    | .84     | 1.05                     |
| 1961 -----                     | .40                | .98     | .51     | .96                      |
| 1962 -----                     | .53                | 1.08    | 1.09    | .59                      |
| 1963 -----                     | .56                | .99     | .82     | .66                      |
| 1964 -----                     | .64                | .79     | .74     | .69                      |
| <b>Total:</b>                  |                    |         |         |                          |
| 1959 -----                     | 3.50               | 1.86    | 4.04    | 3.69                     |
| 1960 -----                     | 10.03              | 2.79    | 4.94    | 3.98                     |
| 1961 -----                     | 5.07               | 1.96    | 1.83    | 2.31                     |
| 1962 -----                     | 3.81               | 2.30    | 3.82    | 1.79                     |
| 1963 -----                     | 8.61               | 3.52    | 2.91    | 1.55                     |
| 1964 -----                     | 7.52               | 1.78    | 1.54    | 2.95                     |
| Percent change, 1964 from 1963 | -13                | -51     | -47     | +90                      |

TABLE B-31.--Canada goose breeding population,  
by areas, Montana, 1963 and 1964

|                 | Hi-Line | Helena | East Slope |
|-----------------|---------|--------|------------|
| <b>Pairs:</b>   |         |        |            |
| 1963-----       | 575     | 101    | 295        |
| 1964-----       | 701     | 62     | 314        |
| <b>Singles:</b> |         |        |            |
| 1963-----       | 155     | 61     | 104        |
| 1964-----       | 63      | 31     | 100        |
| <b>Groups:</b>  |         |        |            |
| 1963-----       | 134     | 139    | 182        |
| 1964-----       | 136     | 17     | 75         |
| <b>Total:</b>   |         |        |            |
| 1963-----       | 1,439   | 402    | 876        |
| 1964-----       | 1,601   | 172    | 803        |

TABLE B-32.--Duck breeding populations, Montana, 1963 and 1964

|   | Sheridan<br>County | Hi-Line |         | Great Falls-<br>Piedmont | Total   |
|---|--------------------|---------|---------|--------------------------|---------|
|   |                    | Eastern | Central |                          |         |
| Total area (sq. mi.) -----              | 1,440              | 7,926   | 9,468   | 7,020                    | 25,854  |
| Area sampled (sq. mi.) -----            | 38                 | 172     | 94      | 143                      | 447     |
| Ducks per sq. mi.:                      |                    |         |         |                          |         |
| 15 year average-----                    | 27.0               | 5.1     | 10.7    | 8.2                      | 9.1     |
| 1963 -----                              | 36.2               | 6.9     | 10.6    | 3.9                      | 9.2     |
| 1964 -----                              | 32.8               | 5.9     | 11.8    | 6.7                      | 9.7     |
| Population index:                       |                    |         |         |                          |         |
| 1963 -----                              | 52,128             | 54,689  | 100,361 | 27,378                   | 234,556 |
| 1964 -----                              | 47,232             | 46,763  | 111,722 | 47,034                   | 252,751 |
| Percent change, 1964 from<br>1963 ----- | -9                 | -14     | +11     | +72                      | +8      |

TABLE B-33.--May and July pond indexes by strata, (North Dakota, South Dakota, and Minnesota), 1959 to 1964

[ Index numbers in thousands ]

| Year                        | Stratum |         |       | Total |
|-----------------------------|---------|---------|-------|-------|
|                             | East    | Central | West  |       |
| May:                        |         |         |       |       |
| 1959 -----                  | 162     | 109     | 41    | 313   |
| 1960 -----                  | 223     | 397     | 52    | 672   |
| 1961 -----                  | 151     | 105     | 33    | 289   |
| 1962 -----                  | 313     | 348     | 72    | 732   |
| 1963 -----                  | 375     | 413     | 80    | 868   |
| 1964 -----                  | 193     | 207     | 60    | 460   |
| Average, 1959-64 -----      | 236     | 263     | 56    | 555   |
| Percent change, 1964 from-- |         |         |       |       |
| 1963 -----                  | -18.2   | -21.3   | +7.1  | -17.1 |
| Average -----               | -48.5   | -49.9   | -25.0 | -47.0 |
| July:                       |         |         |       |       |
| 1959 -----                  | 213     | 110     | 73    | 396   |
| 1960 -----                  | 309     | 311     | 116   | 736   |
| 1961 -----                  | 166     | 108     | 77    | 351   |
| 1962 -----                  | 281     | 231     | 68    | 579   |
| 1963 -----                  | 245     | 275     | 99    | 619   |
| 1964 -----                  | 154     | 211     | 70    | 435   |
| Average, 1963-64 -----      | 227     | 239     | 79    | 544   |
| Percent change, 1964 from-- |         |         |       |       |
| 1963 -----                  | -32.2   | -11.7   | -11.4 | -20.0 |
| Average -----               | -37.1   | -23.3   | -29.3 | -29.7 |

Note:--Due to a change in recording water areas in 1962, 1962 July pond index is not comparable to previous counts.

TABLE B-34. --Waterfowl breeding populations, by species and stratum, North Dakota, South Dakota, and western Minnesota, 1963 and 1964

[Index numbers in thousands]

| Species             | Stratum |         |      | Total |      | Average<br>1959 to<br>1964 | Percent change from-- |         |  |
|---------------------|---------|---------|------|-------|------|----------------------------|-----------------------|---------|--|
|                     | East    | Central | West | 1963  | 1964 |                            | 1963                  | Average |  |
| <b>Ducks:</b>       |         |         |      |       |      |                            |                       |         |  |
| <b>Dabblers:</b>    |         |         |      |       |      |                            |                       |         |  |
| Mallard -----       | 92      | 163     | 38   | 480   | 293  | 286                        | -38.8                 | +2.4    |  |
| Gadwall -----       | 15      | 38      | 6    | 163   | 59   | 60                         | -64.4                 | -1.7    |  |
| American widgeon -  | 1       | 2       | --   | 4     | 3    | 10                         | --                    | -70.0   |  |
| Green-winged teal - | --      | --      | --   | 1     | --   | --                         | --                    | --      |  |
| Blue-winged teal -- | 66      | 224     | 19   | 324   | 309  | 214                        | -4.3                  | +44.4   |  |
| Shoveler -----      | 16      | 41      | 9    | 140   | 66   | 92                         | -52.1                 | -28.3   |  |
| Pintail -----       | 23      | 60      | 3    | 165   | 86   | 147                        | -47.3                 | -41.5   |  |
| Subtotal -----      | 213     | 528     | 75   | 1,276 | 816  | 809                        | -35.8                 | + .9    |  |
| <b>Divers:</b>      |         |         |      |       |      |                            |                       |         |  |
| Redhead-----        | 22      | 23      | --   | 39    | 45   | 25                         | +17.9                 | +80.0   |  |
| Canvasback -----    | 5       | 16      | --   | 17    | 21   | 12                         | +16.7                 | +75.0   |  |
| Scaup -----         | 3       | 2       | --   | 57    | 5    | 31                         | -91.2                 | -83.9   |  |
| Ring-necked duck -  | --      | --      | --   | 9     | --   | 2                          | --                    | --      |  |
| Ruddy duck-----     | --      | 2       | --   | 13    | 2    | 8                          | +84.6                 | -75.0   |  |
| Subtotal -----      | 30      | 43      | --   | 135   | 73   | 78                         | -45.6                 | -6.4    |  |
| Total ducks ----    | 243     | 571     | 75   | 1,411 | 889  | 887                        | -36.8                 | +12     |  |
| Coots -----         | 36      | 31      | --   | 95    | 67   | 92                         | -29.5                 | -27.2   |  |
| Grand total ----    | 279     | 602     | 75   | 1,506 | 956  | 979                        | --                    | --      |  |

TABLE B-35. --Lone drake index, North Dakota, South Dakota, and western Minnesota, 1959 to 1964

| Year        | Percent of total |
|-------------|------------------|
| <b>May:</b> |                  |
| 1959-----   | 41.5             |
| 1960-----   | 73.3             |
| 1961-----   | 67.1             |
| 1962-----   | 73.9             |
| 1963-----   | 77.7             |
| 1964-----   | 67.6             |

TABLE B-36. --Waterfowl brood and late-nesting indexes by stratum  
compared with previous year and long-term averages,  
North Dakota, South Dakota, and western Minnesota, 1964

[Index numbers in thousands]

| Species                                | Stratum |         |      | Total |      | Average | Percent change<br>from-- |         |
|--|---------|---------|------|-------|------|---------|--------------------------|---------|
|  | East    | Central | West | 1963  | 1964 |         | 1963                     | Average |
| <b>Broods:</b>                         |         |         |      |       |      |         |                          |         |
| Ducks brood index -----                | 11.6    | 18.1    | 2.0  | 108.1 | 31.7 | 62.8    | -70.7                    | -49.5   |
| Average brood size <sup>1</sup> -----  | 6.2     | 8.0     | 5.5  | 5.2   | 6.0  | 4.9     | +15.4                    | +22.4   |
| Coot brood index -----                 | .0      | 2.9     | .0   | 4.4   | 2.9  | 3.5     | -34.0                    | -17.1   |
| <b>Late-nesting index:<sup>2</sup></b> |         |         |      |       |      |         |                          |         |
| <b>Dabblers:</b>                       |         |         |      |       |      |         |                          |         |
| Mallard -----                          | 4.9     | 14.0    | 4.5  | 30.8  | 23.4 | 29.7    | -24.0                    | -21.2   |
| Gadwall -----                          | 1.2     | 8.0     | --   | 10.1  | 9.2  | 7.2     | -8.9                     | +27.8   |
| American widgeon -----                 | --      | --      | --   | 1.3   | --   | .5      | --                       | --      |
| Green-winged teal -----                | --      | --      | --   | .4    | --   | .1      | --                       | --      |
| Blue-winged teal -----                 | 8.5     | 19.6    | 2.0  | 17.4  | 30.1 | 20.9    | +73.0                    | +44.0   |
| Shoveler -----                         | --      | 1.8     | --   | --    | 1.8  | .7      | --                       | +157.1  |
| Pintail -----                          | --      | --      | --   | 3.3   | --   | 4.6     | --                       | --      |
| Subtotal -----                         | 14.6    | 43.4    | 6.5  | 63.3  | 64.5 | 63.7    | +1.9                     | +1.3    |
| <b>Divers:</b>                         |         |         |      |       |      |         |                          |         |
| Redhead -----                          | 1.2     | 1.3     | --   | 4.7   | 2.5  | 2.9     | -46.8                    | -13.8   |
| Canvasback -----                       | --      | .4      | --   | --    | .4   | .2      | --                       | +100.0  |
| Scaup -----                            | --      | --      | --   | --    | --   | .4      | --                       | --      |
| Ring-necked duck -----                 | --      | --      | --   | --    | --   | .8      | --                       | --      |
| Ruddy duck-----                        | 1.2     | 1.4     | --   | 16.4  | 2.6  | 7.4     | -84.1                    | -64.9   |
| Subtotal -----                         | 2.4     | 3.1     | --   | 21.1  | 5.5  | 11.7    | -73.9                    | -53.0   |
| Total -----                            | 17.0    | 46.5    | 6.5  | 84.4  | 70.0 | 75.4    | -17.0                    | -7.2    |

<sup>1</sup> Class II and III broods only.

<sup>2</sup> As indicated by adult pairs and singles.

TABLE B-37. --Statewide breeding population  
species composition, Nebraska,  
1963 and 1964

| Species                | 1964    | 1963    | Change  |
|------------------------|---------|---------|---------|
| <b>Ducks:</b>          |         |         |         |
| <b>Dabblers:</b>       |         |         |         |
| Mallard -----          | 69,120  | 38,641  | +30,479 |
| Gadwall -----          | 3,456   | 17,235  | -13,779 |
| American widgeon ----- | 751     | 147     | +604    |
| Blue-winged teal ----- | 23,043  | 36,643  | -13,600 |
| Shoveler -----         | 5,380   | 5,078   | +302    |
| Pintail -----          | 21,886  | 11,873  | +10,013 |
| Subtotal -----         | 123,636 | 109,617 |         |
| <b>Divers:</b>         |         |         |         |
| Redhead -----          | 4,604   | 2,664   | +1,940  |
| Canvasback-----        | 2,519   | 1,104   | -4,415  |
| Scaup -----            | 5,698   | 1,104   | -4,594  |
| Ruddy duck -----       | 882     | 5,316   | -4,434  |
| Subtotal -----         | 13,703  | 10,188  |         |
| Total -----            | 137,339 | 119,805 | +17,535 |

TABLE B-38. --Aerial duck production  
data, Nebraska Sandhills, 1964

|                            | Stratum |       | Total  |
|----------------------------|---------|-------|--------|
|                            | A       | B     |        |
| Number of Transects -----  | 48      | 16    | 64     |
| Square miles sampled ---   | 108     | 36    | 144    |
| Square miles in stratum -- | 10,869  | 5,363 | 16,232 |
| Number of broods seen ---  | 64      | 17    | 75     |

TABLE B-39. --Duck brood composition, aerial  
survey, Nebraska Sandhills, 1964

| Age class       | Broods | Ducklings | Average<br>brood |
|-----------------|--------|-----------|------------------|
| Class I -----   | 4      | 17        |                  |
| Class II-----   | 27     | 114       |                  |
| Class III ----- | 32     | 164       |                  |
| Total -----     | 63     | 295       | 4.68             |

TABLE B-40. --Waterfowl breeding pairs,  
Wyoming, 1963 and 1964

| Species                | Number of adult pairs |         | Percent change from 1963 | Percent change from 1955-63 average | Total duck index |         | Percent change from 1963 | Percent change from 1955-63 average |  |  |  |  |
|------------------------|-----------------------|---------|--------------------------|-------------------------------------|------------------|---------|--------------------------|-------------------------------------|--|--|--|--|
|                        | 1963                  | 1964    |                          |                                     | 1963             | 1964    |                          |                                     |  |  |  |  |
| <b>Ducks:</b>          |                       |         |                          |                                     |                  |         |                          |                                     |  |  |  |  |
| <b>Dabblers:</b>       |                       |         |                          |                                     |                  |         |                          |                                     |  |  |  |  |
| Mallard -----          | 71,024                | 53,575  | -25                      | -1                                  | 149,517          | 111,063 | -26                      | -5.7                                |  |  |  |  |
| Gadwall -----          | 5,025                 | 10,585  | +111                     | +149                                | 10,049           | 21,623  | +115                     | +148                                |  |  |  |  |
| American widgeon ----- | 4,669                 | 5,267   | +13                      | +34.9                               | 11,815           | 10,534  | -11                      | +15.1                               |  |  |  |  |
| Teal -----             | 7,740                 | 10,384  | +34                      | +44.1                               | 19,012           | 27,540  | +45                      | +64.1                               |  |  |  |  |
| Shoveler -----         | 2,580                 | 7,409   | +187                     | +167                                | 6,518            | 22,423  | +244                     | +241                                |  |  |  |  |
| Pintail -----          | 20,506                | 17,758  | -13                      | +21.5                               | 42,506           | 37,924  | -11                      | +20.1                               |  |  |  |  |
| <b>Divers:</b>         |                       |         |                          |                                     |                  |         |                          |                                     |  |  |  |  |
| Redhead -----          | 407                   |         | --                       | --                                  | 407              |         | --                       | --                                  |  |  |  |  |
| Canvasback -----       | 407                   | 605     | +51                      | +107                                | 407              | 1,210   | +197                     | +242                                |  |  |  |  |
| Scap -----             | --                    |         | --                       | --                                  | --               |         | --                       | --                                  |  |  |  |  |
| Goldeneye -----        | 407                   | 605     | +51                      | -34.2                               | 407              | 1,210   | +197                     | +287                                |  |  |  |  |
| Ruddy duck -----       | --                    |         | --                       | --                                  | --               |         | --                       | --                                  |  |  |  |  |
| <b>Miscellaneous:</b>  |                       |         |                          |                                     |                  |         |                          |                                     |  |  |  |  |
| Merganser -----        | 3,531                 | 605     | -83                      | -76.3                               | 8,556            | 1,210   | -86                      | -80.4                               |  |  |  |  |
| Unidentified -----     | 6,383                 | 8,770   | +37                      | +91.3                               | 46,851           | 65,464  | +40                      | +93.4                               |  |  |  |  |
| Coots -----            | 815                   | 752     | -8                       | -52.8                               | 1,630            | 1,504   | -8                       | -48.9                               |  |  |  |  |
| Total -----            | 123,493               | 116,315 | -6                       | +20.5                               | 297,675          | 301,705 | +1                       | +28.8                               |  |  |  |  |

TABLE B-41. --Canada goose breeding pairs, by area, Wyoming, 1963 and 1964

| Area                     | 1963  | 1964             | Percent change from 1963 | Percent change from 9-year average |
|--------------------------|-------|------------------|--------------------------|------------------------------------|
| Snake River -----        | 441   | 379              | -14                      | +5                                 |
| Bear River -----         | 757   | 747              | -1                       | +95                                |
| Green River -----        | 478   | 432              | -10                      | +60                                |
| North Platte River ----- | 312   | 348              | +12                      | +44                                |
| Wind River -----         | 182   | 199 <sup>1</sup> | +9                       | +60                                |
| Big Horn River -----     | 25    | 40 <sup>1</sup>  | +60                      | +60                                |
| Total -----              | 2,195 | 2,145            | -2                       | +53                                |

<sup>1</sup> Estimated

TABLE B-42. --Duck breeding-ground population estimates,  
Colorado, 1963 and 1964

| Area                      | Breeding pairs |        |                                  |
|---------------------------|----------------|--------|----------------------------------|
|                           | 1963           | 1964   | 10-year<br>average,<br>1954-1964 |
| San Luis Valley -----     | 17,377         | 19,063 | 10,721                           |
| North Park -----          | 5,278          | 11,000 | 3,927                            |
| South Platte Valley ----- | 10,513         | 10,517 | 3,528                            |
| Cache la Poudre Valley -  | 2,276          | 2,381  | 1,721                            |
| Yampa Valley-----         | 3,494          | 2,613  | 3,024                            |
| Brown's Park-----         | 60             | 115    | 110                              |
| Total                     | 38,998         | 45,689 | 23,031                           |

TABLE B-43. --Species composition of breeding duck population, Colorado, 1963 and 1964

| Species                 | Number |        |                      | Percent |       |                      |
|-------------------------|--------|--------|----------------------|---------|-------|----------------------|
|                         | 1963   | 1964   | 1954-1963<br>average | 1963    | 1964  | 1954-1963<br>average |
| <b>Dabblers:</b>        |        |        |                      |         |       |                      |
| Mallard -----           | 31,026 | 30,077 | 15,185               | 79.9    | 65.9  | 65.9                 |
| Mexican duck-----       | --     | --     | --                   | --      | --    | --                   |
| Gadwall -----           | 1,358  | 2,298  | 1,945                | 3.4     | 5.0   | 8.4                  |
| American widgeon -----  | 76     | 834    | 249                  | 0.2     | 1.8   | 1.1                  |
| Green-winged teal ----- | 242    | 475    | 456                  | 0.6     | 1.0   | 2.0                  |
| Blue-winged teal -----  | 3,718  | 3,375  | 1,315                | 9.4     | 7.4   | 5.7                  |
| Cinnamon teal -----     | 369    | 363    | 598                  | 0.9     | 0.8   | 2.6                  |
| Shoveler-----           | 471    | 1,413  | 652                  | 1.2     | 3.1   | 2.8                  |
| Pintail -----           | 838    | 3,732  | 1,386                | 2.1     | 8.2   | 6.0                  |
| Wood duck-----          | --     | --     | --                   | --      | --    | --                   |
| <b>Divers:</b>          |        |        |                      |         |       |                      |
| Redhead -----           | 554    | 2,558  | 689                  | 1.4     | 5.6   | 3.0                  |
| Canvasback-----         | --     | 2      | 21                   | --      | Trace | 0.1                  |
| Scaup-----              | 2      | 194    | 335                  | Trace   | 0.4   | 1.5                  |
| Ring-necked duck-----   | --     | --     | --                   | --      | --    | --                   |
| Bufflehead-----         | --     | 11     | 2                    | --      | Trace | Trace                |
| Ruddy duck-----         | --     | --     | 62                   | --      | --    | 0.3                  |
| <b>Miscellaneous:</b>   |        |        |                      |         |       |                      |
| Merganser -----         | 317    | 357    | 133                  | 0.8     | 0.8   | 0.6                  |
| Total -----             | 38,998 | 45,689 | 23,028               | 100.0   | 100.0 | 100.0                |

TABLE B-44.--Number of Canada geese by breeding classification, Moffat County, Colorado, 1964

| Area   | Nesting pairs | Non-breeding pairs | Goslings<br>(estimate) <sup>1</sup> | Groups | Total | Percent change from-- |         |
|--|---------------|--------------------|-------------------------------------|--------|-------|-----------------------|---------|
|  |               |                    |                                     |        |       | 1963                  | Average |
| Yampa:   |               |                    |                                     |        |       |                       |         |
| Craig to Juniper Springs -----                         | 20            | 17                 | 114                                 | 73     | 261   |                       |         |
| Juniper to Cross Mountain-----                         | 13            | 11                 | 71                                  | 9      | 128   |                       |         |
| Lily Park -----  | 22            | 9                  | 105                                 | 28     | 195   |                       |         |
| Subtotal -----   | 55            | 37                 | 290                                 | 110    | 584   | +25                   | +174    |
| Green (Brown's Park)-----                              | --            | 14                 | --                                  | 23     | 51    | +240                  | -7      |
| Little Snake (25 mi. up-stream from lower bridge)----- | 25            | 37                 | 137                                 | 58     | 319   | +105                  | +177    |
| Total -----  | 80            | 88                 | 427                                 | 191    | 954   | +49                   | +149    |

<sup>1</sup>Includes both eggs and goslings.

TABLE B-45.--Waterfowl breeding populations, by stratum, northern Saskatchewan, northern Manitoba, and western Ontario, May 1963 and 1964

[Index numbers, in thousands]

| Species                 | Ontario C | Stratum  |     |                    |       | Total |      | Percent change |  |
|-------------------------|-----------|----------|-----|--------------------|-------|-------|------|----------------|--|
|                         |           | Manitoba |     | Saskatchewan C     |       | 1963  | 1964 |                |  |
|                         |           | D        | C   | South <sup>1</sup> | North |       |      |                |  |
| Ducks:                  |           |          |     |                    |       |       |      |                |  |
| Dabblers:               |           |          |     |                    |       |       |      |                |  |
| Mallard -----           | 56        | 30       | 47  |                    | 59    | 179   | 192  | +7.3           |  |
| Black duck -----        | 25        | --       | 2   |                    | 2     | 25    | 30   | +20.0          |  |
| Gadwall -----           | 1         | 5        | --  |                    | 2     | 8     | 9    | +12.5          |  |
| American widgeon -----  | 4         | 8        | 9   |                    | 12    | 24    | 33   | +37.5          |  |
| Green-winged teal ----- | 6         | 1        | 3   |                    | 8     | 10    | 19   | +90.0          |  |
| Blue-winged teal -----  | 1         | 12       | --  |                    | 23    | 30    | 37   | +23.3          |  |
| Shoveler -----          | --        | 13       | 1   |                    | 12    | 12    | 26   | +116.7         |  |
| Pintail -----           | 2         | 10       | 3   |                    | 7     | 20    | 21   | +5.0           |  |
| Subtotal -----          | 95        | 79       | 65  |                    | 125   | 308   | 367  | +14.8          |  |
| Divers:                 |           |          |     |                    |       |       |      |                |  |
| Redhead -----           | --        | 8        | 1   |                    | 8     | 10    | 17   | +70.0          |  |
| Canvasback -----        | --        | 9        | 4   |                    | 23    | 31    | 37   | +19.4          |  |
| Scaup -----             | 42        | 39       | 44  |                    | 72    | 256   | 197  | -23.1          |  |
| Ring-necked duck -----  | 15        | 6        | 19  |                    | 5     | 120   | 45   | -62.5          |  |
| Goldeneye -----         | 19        | 1        | 1   |                    | 2     | 47    | 23   | -51.1          |  |
| Bufflehead-----         | 1         | 2        | --  |                    | 6     | 27    | 9    | -66.7          |  |
| Ruddy duck -----        | --        | --       | --  |                    | --    | 4     | 1    | -75.0          |  |
| Subtotal -----          | 77        | 65       | 69  |                    | 116   | 495   | 329  | -33.5          |  |
| Miscellaneous:          |           |          |     |                    |       |       |      |                |  |
| Scoter -----            | --        | 1        | 2   |                    | 5     | 23    | 8    | -65.2          |  |
| Merganser -----         | 60        | 7        | 30  |                    | 12    | 166   | 109  | -34.3          |  |
| Subtotal -----          | 60        | 8        | 32  |                    | 17    | 189   | 117  | -38.1          |  |
| Total ducks -----       | 232       | 152      | 166 |                    | 258   | 992   | 813  | -19.1          |  |
| Canada geese-----       | 25        | --       | 1   |                    | --    | 31    | 27   | -12.9          |  |
| Coots -----             | --        | 16       | --  |                    | 3     | 18    | 17   | -5.6           |  |

<sup>1</sup>Area not flown in 1964.

TABLE B-46.--Duck broods, by class and stratum, northern Saskatchewan, northern Manitoba, and western Ontario 1963 and 1964

| Year and class | Ontario C | Stratum  |    |                |       | Total broods | Percent of year's total |  |  |
|----------------|-----------|----------|----|----------------|-------|--------------|-------------------------|--|--|
|                |           | Manitoba |    | Saskatchewan C |       |              |                         |  |  |
|                |           | C        | D  | South          | North |              |                         |  |  |
| 1963:          |           |          |    |                |       |              |                         |  |  |
| Class I-----   | 4         | 2        | 10 | 11             | --    | 27           | 12                      |  |  |
| Class II-----  | 27        | 29       | 58 | 59             | 8     | 181          | 80                      |  |  |
| Class III----- | 3         | 7        | 1  | 6              | 2     | 19           | 8                       |  |  |
| 1964:          |           |          |    |                |       |              |                         |  |  |
| Class I-----   | 5         | 3        | 21 | 14             | 3     | 49           | 11                      |  |  |
| Class II-----  | 26        | 50       | 98 | 104            | 14    | 292          | 71                      |  |  |
| Class III----- | 4         | 21       | 13 | 25             | 9     | 72           | 18                      |  |  |

TABLE B-47.--Production survey indexes, by stratum, northern Saskatchewan, northern Manitoba, and western Ontario, July, 1955 to 1964

[Index numbers, in thousands]

| Year                             | Ontario C | Stratum  |    |                |       | Total |  |
|----------------------------------|-----------|----------|----|----------------|-------|-------|--|
|                                  |           | Manitoba |    | Saskatchewan C |       |       |  |
|                                  |           | C        | D  | South          | North |       |  |
| Number of young: <sup>1</sup>    |           |          |    |                |       |       |  |
| 1955-----                        | --        | 59       | 30 | 46             | 80    | 215   |  |
| 1956-----                        | --        | 2        | 7  | 11             | 86    | 106   |  |
| 1959-----                        | --        | 25       | 20 | 62             | 58    | 165   |  |
| 1960-----                        | 60        | 45       | 26 | 26             | 56    | 213   |  |
| 1961-----                        | 116       | 47       | 37 | 38             | 65    | 303   |  |
| 1962-----                        | 173       | 52       | 24 | 68             | 77    | 394   |  |
| 1963-----                        | 129       | 64       | 52 | 144            | 92    | 481   |  |
| 1964-----                        | 114       | 97       | 84 | 230            | 235   | 760   |  |
| Late-nesting index: <sup>2</sup> |           |          |    |                |       |       |  |
| 1955-----                        | --        | 29       | 10 | 11             | 13    | 63    |  |
| 1956-----                        | --        | 2        | 7  | 5              | 28    | 42    |  |
| 1959-----                        | --        | 9        | 4  | 9              | 17    | 39    |  |
| 1960-----                        | 22        | 9        | 6  | 8              | 17    | 62    |  |
| 1961-----                        | 6         | 8        | 16 | 9              | 12    | 51    |  |
| 1962-----                        | 100       | 30       | 58 | 82             | 29    | 299   |  |
| 1963-----                        | 124       | 49       | 29 | 65             | 64    | 359   |  |
| 1964-----                        | 60        | 44       | 39 | 58             | 66    | 267   |  |

<sup>1</sup> Number of broods multiplied by average brood size.

<sup>2</sup> As indicated by adult pairs and singles.

TABLE B-48. --May and July pond indexes, southern Manitoba, 1953 to 1964

[Indexes numbers, in thousands]

| Year                               | Stratum |       | Total |
|------------------------------------|---------|-------|-------|
|                                    | A       | B     |       |
| <b>May:</b>                        |         |       |       |
| 1953-----                          | 187     | 312   | 499   |
| 1954-----                          | 258     | 1,075 | 1,333 |
| 1955-----                          | 315     | 428   | 743   |
| 1956-----                          | 391     | 615   | 1,006 |
| 1957-----                          | 262     | 404   | 666   |
| 1958-----                          | 352     | 264   | 616   |
| 1959-----                          | 160     | 482   | 642   |
| 1960-----                          | 324     | 295   | 619   |
| 1961-----                          | 158     | 263   | 421   |
| 1962-----                          | 135     | 295   | 430   |
| 1963-----                          | 298     | 331   | 629   |
| 1964-----                          | 398     | 331   | 729   |
| Average 1953 to 1963               | 258     | 436   | 691   |
| Percent change,<br>from 1963 ----- | +34     | --    | +16   |
| Average -----                      | +54     | -24   | +5    |
| <b>July:</b>                       |         |       |       |
| 1954-----                          | 473     | 384   | 857   |
| 1955-----                          | 399     | 271   | 610   |
| 1956-----                          | 425     | 411   | 836   |
| 1957-----                          | 241     | 260   | 501   |
| 1958-----                          | 163     | 341   | 504   |
| 1959-----                          | 96      | 325   | 420   |
| 1960-----                          | 164     | 212   | 376   |
| 1961-----                          | 41      | 86    | 129   |
| 1962-----                          | 97      | 135   | 232   |
| 1963-----                          | 145     | 178   | 323   |
| 1964-----                          | 201     | 182   | 383   |
| Average 1954 to 1963               | 218     | 260   | 478   |
| Percent change,<br>from 1963 ----- | +39     | +2    | +19   |
| Average -----                      | -8      | -30   | -20   |

TABLE B-49. --Waterfowl breeding population index, southern Manitoba, 1963 and 1964

| Species                 | Stratum |         | Total            |                 | Average<br>1953 to<br>1963 | Percent change from |         |
|-------------------------|---------|---------|------------------|-----------------|----------------------------|---------------------|---------|
|                         | A       | B       | Previous<br>year | Current<br>year |                            | 1963                | Average |
| <b>Ducks:</b>           |         |         |                  |                 |                            |                     |         |
| Dabblers:               |         |         |                  |                 |                            |                     |         |
| Mallard -----           | 73,800  | 93,200  | 182,000          | 167,000         | 308,000                    | -8.2                | -45.8   |
| Black duck -----        | 200     | --      | 1,400            | 200             | 200                        | -85.7               | -85.7   |
| Gadwall -----           | 7,700   | 3,100   | 14,300           | 10,800          | 7,800                      | -24.5               | +38.5   |
| American widgeon -----  | 11,400  | 8,600   | 15,200           | 20,000          | 22,700                     | +31.6               | -11.9   |
| Green-winged teal ----- | 300     | --      | 4,700            | 300             | 3,700                      | -93.6               | -91.9   |
| Blue-winged teal -----  | 33,700  | 4,500   | 47,000           | 38,200          | 76,800                     | -18.7               | -50.3   |
| Shoveler -----          | 26,300  | 11,700  | 33,300           | 38,000          | 29,200                     | +14.1               | +30.1   |
| Pintail -----           | 30,500  | 11,100  | 61,700           | 41,600          | 76,800                     | -32.6               | -45.9   |
| Wood duck -----         | --      | --      | --               | --              | --                         | --                  | --      |
| Subtotal -----          | 183,900 | 132,200 | 359,600          | 316,100         | 525,200                    | -12.1               | -39.8   |
| Divers:                 |         |         |                  |                 |                            |                     |         |
| Redhead -----           | 13,600  | 18,300  | 33,800           | 31,900          | 20,500                     | -5.6                | +55.6   |
| Canvasback -----        | 20,700  | 17,300  | 30,500           | 38,000          | 30,700                     | +24.6               | +23.8   |
| Scaup -----             | 31,100  | 41,200  | 55,700           | 72,300          | 74,700                     | +29.8               | -3.2    |
| Ring-necked duck -----  | 1,200   | 600     | 6,800            | 1,800           | 4,700                      | -73.5               | -61.7   |
| Goldeneye -----         | 700     | 1,100   | 1,100            | 1,800           | 4,000                      | +63.6               | -55.0   |
| Bufflehead-----         | 1,400   | 2,500   | 5,400            | 3,900           | 3,400                      | -27.8               | +14.7   |
| Ruddy duck -----        | 10,700  | 900     | 14,600           | 11,600          | 9,300                      | -20.5               | +24.7   |
| Subtotal -----          | 79,400  | 81,900  | 147,900          | 161,300         | 147,300                    | +9.1                | +9.5    |
| Miscellaneous:          |         |         |                  |                 |                            |                     |         |
| Scoter -----            | 100     | 500     | 400              | 600             | 500                        | +150.0              | 20.0    |
| Merganser -----         | 900     | 3,100   | --               | 4,000           | 100                        | +4,000.0            |         |
| Subtotal -----          | 1,000   | 3,600   | 400              | 4,600           | 600                        | +1,150.0            | +767.0  |
| Total ducks -----       | 264,300 | 217,700 | 507,900          | 482,000         | 673,100                    | -5.1                | -28.4   |
| Geese:                  |         |         |                  |                 |                            |                     |         |
| Canada goose-----       | --      | --      | --               | --              | --                         | --                  | --      |
| Coots -----             | 45,000  | 11,200  | 54,400           | 56,200          | 56,300                     | +3.3                | +3.3    |
| Grand total -----       | 309,300 | 228,900 | 562,300          | 538,200         | 729,400                    | +4.3                | -26.2   |

TABLE B-50.--Species breeding composition percentage, southern Manitoba, 1960 to 1964

| Species                 | 1960  | 1961 | 1962 | 1963 | 1964  |
|-------------------------|-------|------|------|------|-------|
| <b>Ducks:</b>           |       |      |      |      |       |
| <b>Dabblers:</b>        |       |      |      |      |       |
| Mallard -----           | 27.1  | 28.1 | 29.0 | 25.1 | 34.9  |
| Gadwall -----           | 3.5   | 6.0  | 4.4  | 3.3  | 2.3   |
| American widgeon -----  | 4.2   | 5.1  | 5.8  | 4.8  | 4.6   |
| Green-winged teal ----- | 1.4   | 1.7  | 1.3  | 1.8  | Trace |
| Blue-winged teal -----  | 19.8  | 24.8 | 19.3 | 28.3 | 8.0   |
| Shoveler-----           | 8.0   | 8.4  | 8.2  | 8.4  | 8.0   |
| Pintail -----           | 16.2  | 11.6 | 11.1 | 11.1 | 8.7   |
| Subtotal -----          | 80.4  | 85.7 | 79.1 | 82.8 | 66.5  |
| <b>Divers:</b>          |       |      |      |      |       |
| Redhead -----           | 6.3   | 3.9  | 6.1  | 4.7  | 6.7   |
| Canvasback-----         | 3.8   | 3.0  | 5.9  | 3.9  | 7.9   |
| Scaup -----             | 4.6   | 3.7  | 5.2  | 4.8  | 15.1  |
| Ring-necked duck -----  | 1.8   | 0.7  | 1.3  | 0.5  | 0.4   |
| Goldeneye-----          | 0.6   | 0.1  | 0.3  | 0.2  | 0.4   |
| Bufflehead-----         | 0.3   | 0.4  | 0.4  | 0.3  | 0.8   |
| Ruddy duck -----        | 2.6   | 2.3  | 1.6  | 2.7  | 2.4   |
| Subtotal -----          | 19.8  | 14.1 | 20.8 | 17.1 | 33.5  |
| Total -----             | 100.2 | 99.8 | 99.9 | 99.9 | 100.0 |

TABLE B-51.--Lone drake index,  
southern Manitoba, 1953 to 1964[Expressed as percentage of  
total drakes]

| Year      | Percent<br>lone drakes <sup>1</sup> |
|-----------|-------------------------------------|
| 1953----- | 70.1                                |
| 1954----- | 79.6                                |
| 1955----- | 87.5                                |
| 1956----- | 79.4                                |
| 1957----- | 89.2                                |
| 1958----- | 81.9                                |
| 1959----- | 70.0                                |
| 1960----- | 86.5                                |
| 1961----- | 67.5                                |
| 1962----- | 62.0                                |
| 1963----- | 83.7                                |
| 1964----- | 78.1                                |

<sup>1</sup>Includes only mallards,  
pintails, and canvasback.

TABLE B-52. --Waterfowl population summary,  
southern Manitoba, July 1964

|                                       | Stratum A | Stratum B | Strata A<br>and B |
|---------------------------------------|-----------|-----------|-------------------|
| Area in square miles -----            | 10,368    | 28,600    | 38,968            |
| Lineal miles in sample -----          | 1,578     | 636       | 2,214             |
| Square miles in waterfowl sample----- | 197.25    | 79.5      | 276.75            |
| Expansion factor -----                | 52.563    | 359.75    | --                |
| <br>Broods:                           |           |           |                   |
| Broods seen -----                     | 233       | 36        | 269               |
| Brood indexes -----                   | 12,200    | 13,000    | 25,200            |
| Broods per square mile-----           | 1.18      | .45       | .65               |
| <br>Late nesters:                     |           |           |                   |
| Late nesters seen-----                | 346       | 42        | 388               |
| Late nesting index -----              | 18,200    | 15,100    | 33,300            |
| Late nesters per square mile-----     | 1.8       | .50       | .85               |
| <br>Coots:                            |           |           |                   |
| Coot broods seen -----                | 162       | 12        | 174               |
| Coot brood index -----                | 8,500     | 4,300     | 12,800            |
| Coot broods per square mile -----     | .80       | .15       | .33               |
| <br>Ponds:                            |           |           |                   |
| Ponds seen -----                      | 3,823     | 506       | 4,329             |
| Pond index -----                      | 201,000   | 182,000   | 383,000           |
| Ponds per square mile -----           | 19.4      | 6.4       | 9.8               |

Note: Transects B 9 and 10 not flown.

TABLE B-53. -- Waterfowl brood and late-nesting indexes, by stratum compared with previous year and long-term average, southern Manitoba, 1964

[Index numbers in thousands]

| Species                                | Stratum |      | Total |      | Average<br>1954 to<br>1963 | Percent change from |         |
|--|---------|------|-------|------|----------------------------|---------------------|---------|
|  | A       | B    | 1963  | 1964 |                            | Previous<br>year    | Average |
| <b>Broods:</b>                         |         |      |       |      |                            |                     |         |
| Duckbrood index -----                  | 12.2    | 13.0 | 32.3  | 25.2 | 34.5                       | -22                 | -27     |
| Average brood size <sup>1</sup> -----  | 5.4     | 4.5  | 5.4   | 5.0  | 5.6                        | -8                  | -11     |
| Coot brood index -----                 | 8.5     | 4.3  | 3.5   | 12.8 | 7.2                        | +266                | +78     |
| <b>Late-nesting index<sup>2</sup>:</b> |         |      |       |      |                            |                     |         |
| <b>Dabblers:</b>                       |         |      |       |      |                            |                     |         |
| Mallards-----                          | 4.7     | 4.3  | 13.3  | 9.0  | 16.5                       | -32                 | -45     |
| Gadwall-----                           | 0.7     | --   | 2.1   | 0.7  | 1.3                        | -67                 | -46     |
| American widgeon-----                  | 1.2     | --   | 4.3   | 1.2  | 3.2                        | -72                 | -62     |
| Green-winged teal-----                 | 0.1     | --   | 0.1   | 0.2  | 0.5                        | -50                 | -80     |
| Blue-winged teal-----                  | 2.1     | 3.2  | 2.6   | 5.3  | 7.8                        | +104                | -32     |
| Shoveler-----                          | 0.4     | 5.1  | 0.2   | 5.5  | 0.8                        | +1750               | +588    |
| Pintail-----                           | 0.3     | --   | 2.2   | 0.3  | 2.5                        | -86                 | -88     |
| Subtotal -----                         | 19.5    | 12.6 | 24.9  | 22.1 | 32.6                       | -11                 | -32     |
| <b>Divers:</b>                         |         |      |       |      |                            |                     |         |
| Redhead-----                           | 0.4     | 1.4  | 0.7   | 1.8  | 1.5                        | +157                | +20     |
| Canvasback-----                        | 0.3     | --   | 1.1   | 0.3  | 1.2                        | -73                 | -75     |
| Scaup-----                             | 2.5     | --   | 1.7   | 2.5  | 3.4                        | +47                 | -26     |
| Ring-necked duck-----                  | --      | --   | 0.2   | --   | 0.7                        | --                  | --      |
| Goldeneye-----                         | 0.1     | --   | 0.2   | 0.1  | 0.3                        | -50                 | -67     |
| Bufflehead-----                        | 0.1     | --   | 0.2   | 0.1  | 0.5                        | -50                 | -80     |
| Ruddy duck-----                        | 5.2     | 1.1  | 8.0   | 6.3  | 4.8                        | -21                 | +31     |
| Subtotal -----                         | 8.6     | 2.5  | 12.1  | 11.1 | 12.4                       | -8                  | -10     |
| Miscellaneous -----                    | 0.1     | --   | --    | 0.1  | 0.2                        | +100                | -50     |
| Total ducks-----                       | 18.2    | 15.1 | 37.0  | 33.3 | 45.2                       | -10                 | -26     |

<sup>1</sup> Class II and III broods only.

<sup>2</sup> As indicated by adult pairs and singles.

**TABLE B-54.**--Percentage age-class distribution of duck broods, by stratum, southern Manitoba, 1954 to 1964

| Year       | Stratum A |          |           | Stratum B |          |           | Total   |          |           |
|------------|-----------|----------|-----------|-----------|----------|-----------|---------|----------|-----------|
|            | Class I   | Class II | Class III | Class I   | Class II | Class III | Class I | Class II | Class III |
| 1954 ----- | 61.5      | 33.5     | 5.0       | 62.9      | 20.0     | 17.1      | 62.2    | 26.4     | 11.4      |
| 1955 ----- | 41.9      | 30.2     | 27.9      | 17.4      | 43.5     | 39.1      | 29.9    | 36.7     | 33.4      |
| 1956 ----- | 31.2      | 41.6     | 27.2      | 17.6      | 50.0     | 32.4      | 29.4    | 42.8     | 27.8      |
| 1957 ----- | 29.2      | 43.2     | 27.6      | 28.1      | 56.1     | 15.8      | 29.1    | 44.4     | 26.5      |
| 1958 ----- | 51.7      | 34.5     | 13.8      | 45.2      | 45.2     | 9.7       | 51.2    | 35.4     | 13.5      |
| 1959 ----- | 60.4      | 32.7     | 6.8       | 63.0      | 34.8     | 2.2       | 60.8    | 33.0     | 6.2       |
| 1960 ----- | 47.4      | 45.4     | 7.2       | 41.0      | 54.1     | 4.9       | 45.9    | 47.5     | 6.7       |
| 1961 ----- | 35.6      | 50.0     | 14.4      | 28.8      | 59.1     | 12.1      | 30.9    | 56.3     | 12.8      |
| 1962 ----- | 40.2      | 50.5     | 9.2       | 42.3      | 42.3     | 15.4      | 40.6    | 48.7     | 10.7      |
| 1963 ----- | 9.5       | 44.4     | 46.1      | 16.6      | 41.7     | 41.7      | 11.0    | 43.8     | 45.2      |
| 1964 ----- | 36.3      | 52.5     | 11.2      | 27.6      | 58.6     | 13.8      | 35.2    | 53.2     | 11.6      |

**TABLE B-55.**--Waterfowl breeding population, by area and year, Chippewa National Forest, Minnesota, 1963 and 1964

| AREA                   | 1963  | 1964  | Percent change |
|------------------------|-------|-------|----------------|
| Bowstring -----        | 238   | 245   | +3             |
| Burns -----            | 107   | 118   | +10            |
| Kitchie -----          | 112   | 204   | +82            |
| Lower Pigeon -----     | 117   | 85    | -27            |
| Mud Lake -----         | 251   | 141   | -44            |
| Raven Lake -----       | 17    | 11    | -35            |
| Round Lake -----       | 327   | 729   | +123           |
| Third River -----      | 141   | 184   | +30            |
| Lake Winnibigoshish -- | 568   | 309   | -45            |
| Rabideau Lake -----    | 247   | 247   | --             |
| Total -----            | 2,125 | 2,273 | +7             |

**TABLE B-56.**--Species composition, Chippewa National Forest, Minnesota, 1963 and 1964

| SPECIES                | 1963 | 1964 |
|------------------------|------|------|
| Mallard -----          | 52   | 43   |
| American widgeon ----- | 8    | 12   |
| Blue-winged teal ----- | 11   | 18   |
| Wood duck -----        | 13   | 13   |
| Ring-necked duck ----- | 1    | 3    |
| Goldeneye -----        | 12   | 16   |
| Other -----            | 3    | 1    |

TABLE B-57.--Duck production ratios, Chippewa National Forest,  
Minnesota, 1963 and 1964

| Species                | 1963   |           |       | 1964   |           |       |
|------------------------|--------|-----------|-------|--------|-----------|-------|
|                        | Adults | Juveniles | Ratio | Adults | Juveniles | Ratio |
| Mallard -----          | 373    | 730       | 1:1.9 | 524    | 643       | 1:1.2 |
| American widgeon ----- | 53     | 127       | 1:2.3 | 123    | 158       | 1:1.3 |
| Blue-winged teal ----- | 39     | 186       | 1:4.7 | 58     | 147       | 1:2.5 |
| Wood duck -----        | 65     | 204       | 1:3.1 | 108    | 185       | 1:1.7 |
| Ring-necked duck ----- | 8      | 30        | 1:3.7 | 26     | 47        | 1:1.8 |
| Goldeneye -----        | 32     | 214       | 1:6.7 | 95     | 281       | 1:2.9 |
| Other -----            | 25     | 39        | 1:5.0 | 3      | 29        | 1:9.6 |
| Total -----            | 595    | 1,530     | 1:2.5 | 937    | 1,490     | 1:1.6 |

TABLE B-58.--Duck breeding population index, Michigan, 1963 and 1964

| Year      | Lineal miles censused | Potential breeders per lineal mile |             |
|-----------|-----------------------|------------------------------------|-------------|
|           |                       | Wood duck                          | All species |
| 1963----- | 128.5                 | 2.03 <sup>1</sup>                  | 20.10       |
| 1964----- | 137.4                 | 1.60                               | 17.09       |

<sup>1</sup>Lineal miles for wood duck was 137.4

TABLE B-59.--Duck production index, Michigan, 1963 and 1964

| Year       | Number per lineal mile |                |             | Average brood size |
|------------|------------------------|----------------|-------------|--------------------|
|            | Broods                 | Hens and young | Lone drakes |                    |
| 1951 ----- | 0.35                   | 2.20           | 3.31        | 5.76               |
| 1952 ----- | .70                    | 3.92           | 3.21        | 4.60               |
| 1953 ----- | .51                    | 3.63           | 4.32        | 6.10               |
| 1954 ----- | .20                    | 1.67           | 4.60        | 6.24               |
| 1955 ----- | .64                    | 4.65           | 5.09        | 6.28               |
| 1956 ----- | .53                    | 3.67           | 4.40        | 5.86               |
| 1957 ----- | .38                    | 2.30           | 4.80        | 5.10               |
| 1958 ----- | .31                    | 2.18           | 6.50        | 5.97               |
| 1959 ----- | .66                    | 4.00           | 12.58       | 5.06               |
| 1960 ----- | .33                    | 2.48           | 14.49       | 6.50               |
| 1961 ----- | .67                    | 3.80           | 7.71        | 5.64               |
| 1962 ----- | .87                    | 5.64           | 8.48        | 5.60               |
| 1963 ----- | 1.08                   | 6.82           | 6.06        | 5.33               |
| 1964 ----- | .80                    | 5.83           | 8.77        | 5.76               |

<sup>1</sup>Average wood duck brood size was 6.5

TABLE B-60.--Comparison of duck broods, Wisconsin, 1964

| Species and class   | 1964          |              |                            | 1950-56 <sup>1</sup>       |               |
|---------------------|---------------|--------------|----------------------------|----------------------------|---------------|
|                     | Number broods | Number young | Average number young brood | Average number young brood | Number broods |
| Mallard:            |               |              |                            |                            |               |
| Age class I -----   | 15            | 105          | 7.0                        | 7.5                        | 64            |
| Age class II -----  | 31            | 229          | 7.4                        | 6.8                        | 147           |
| Age class III ----- | 16            | 86           | 5.4                        | 6.4                        | 112           |
| Blue-winged teal:   |               |              |                            |                            |               |
| Age class I -----   | 9             | 63           | 7.0                        | 7.8                        | 119           |
| Age class II -----  | 14            | 92           | 6.6                        | 7.2                        | 167           |
| Age class III ----- | 2             | 2            | 2                          | 6.6                        | 48            |
| Wood duck:          |               |              |                            |                            |               |
| Age class I -----   | 8             | 57           | 7.1                        | 8.3                        | 23            |
| Age class II -----  | 20            | 129          | 6.5                        | 7.1                        | 32            |
| Age class III ----- | 8             | 46           | 5.8                        | 5.3                        | 23            |

<sup>1</sup> Duck and Coot Ecology and Management in Wisconsin, 1964, Jahn, L. R., and R. A. Hunt, Wisconsin Conservation Department Technical Bulletin (In Press).

<sup>2</sup> Insufficient data available.

TABLE B-61.--Wood duck broods observed by stream section and age class, Indiana, 1964

| Stream area        | Miles of transect | Date censused<br>1964 | Number of broods |      |    |              |      |    | Percent change from 1963 |    |       |
|--------------------|-------------------|-----------------------|------------------|------|----|--------------|------|----|--------------------------|----|-------|
|                    |                   |                       | Age class I      |      |    | Age class II |      |    |                          |    |       |
|                    |                   |                       | A                | B    | C  | A            | B    | C  |                          |    |       |
|                    |                   |                       | 1963             | 1964 |    | 1963         | 1964 |    |                          |    |       |
| Maumee -----       | 15                | 5/21                  | --               | 3    | 2  | 1            | 2    | 1  | 13                       | 9  | -30.8 |
| Elkhart -----      | 17                | 5/20                  | --               | 2    | 1  | --           | 1    | -- | 7                        | 4  | -42.9 |
| Iroquois -----     | 14                | 6/3                   | --               | 1    | 1  | 1            | --   | -- | 5                        | 3  | -40.0 |
| Minnissinewa-----  | 13                | 5/22                  | 1                | 3    | 2  | --           | 1    | -- | 5                        | 7  | +40.0 |
| Big Blue -----     | 12                | 5/27                  | --               | --   | 1  | 1            | --   | -- | 13                       | 2  | -84.6 |
| White, West Fork-- | 25                | 5/26                  | 1                | --   | 4  | 1            | 1    | -- | 16                       | 7  | -56.3 |
| Muscatatuck -----  | 19                | 6/4                   | --               | --   | 2  | 2            | 2    | -- | 56                       | 6  | -89.3 |
| Salt Creek-----    | 15                | 6/3                   | --               | 3    | 6  | 2            | --   | 1  | 26                       | 12 | -53.8 |
| Eel River -----    | 13                | 6/2                   | --               | --   | 2  | 3            | 1    | 1  | 9                        | 7  | -22.2 |
| Total -----        | 143               |                       | 2                | 12   | 21 | 11           | 8    | 3  | 150                      | 57 | -62.0 |

TABLE B-62.--Wood duck nesting effort and production data, Missouri,  
1963 and 1964

|                                       | 1963   | 1964   | Percent<br>change<br>from<br>1963 |
|---------------------------------------|--------|--------|-----------------------------------|
| Lake and marsh censused (acres) ----- | 10,938 | 10,955 |                                   |
| Streams censused (miles) -----        | 743    | 730    |                                   |
| Wood duck:                            |        |        |                                   |
| Nesting effort:                       |        |        |                                   |
| Per sq. mile of lake and marsh -----  | 12.7   | 6.0    | -52.8                             |
| Per mile of stream-----               | .33    | .32    | -3.0                              |
| Number of broods (stream) -----       | 122    | 105    | -13.9                             |
| Broods per mile (stream) -----        | .16    | .14    | -12.5                             |
| Number of broods (marsh)-----         | 42     | 25     | -40.4                             |
| Broods per sq. mi. (marsh) -----      | 2.5    | 1.5    | -40.0                             |
| Average number of ducklings           |        |        |                                   |
| Class I -----                         | 6.6    | 6.5    | -1.5                              |
| Class II-----                         | 7.1    | 5.5    | -22.5                             |
| Class III -----                       | 5.1    | 4.2    | -17.6                             |

TABLE B-63.--Number of water bodies, southwest Manitoba, May 1963 and 1964

| Area                      | 1963  | 1964  | Percent change<br>1963-1964 |
|---------------------------|-------|-------|-----------------------------|
| Streams -----             | 45    | 45    | 0                           |
| Dugouts -----             | 56    | 52    | +13                         |
| Field (sheet) water ----- | 221   | 344   | +56                         |
| Other -----               | 1,382 | 1,657 | +11                         |
| Total -----               | 1,694 | 2,088 | +23                         |
| Water areas/sq. mi. ---   | 21.7  | 26.9  |                             |

TABLE B-64. --Waterfowl breeding population, southwest Manitoba,  
May 1963 and 1964

| Species                  | 1963  | 1964  | Percent change<br>from 1963 |
|--------------------------|-------|-------|-----------------------------|
| Ducks:                   |       |       |                             |
| Dabblers:                |       |       |                             |
| Mallard -----            | 332   | 375   | +13                         |
| Gadwall -----            | 43    | 92    | +111                        |
| American widgeon -----   | 64    | 75    | +17                         |
| Green-winged teal -----  | 24    | 35    | +46                         |
| Blue-winged teal -----   | 374   | 651   | +74                         |
| Shoveler -----           | 111   | 243   | +112                        |
| Pintail -----            | 147   | 239   | +63                         |
| Subtotal -----           | 1,095 | 1,710 | +56                         |
| Divers:                  |       |       |                             |
| Redhead -----            | 53    | 107   | +102                        |
| Canvasback -----         | 58    | 99    | +71                         |
| Scaup -----              | 64    | 70    | +25                         |
| Ring-necked duck -----   | 6     | 19    | +317                        |
| Goldeneye -----          | 3     | 14    | +467                        |
| Bufflehead -----         | 4     | 4     | --                          |
| Ruddy duck -----         | 35    | 34    | -3                          |
| Subtotal -----           | 223   | 347   | +55                         |
| Unidentified ducks ----- | --    | 4     | --                          |
| Total ducks -----        | 1,318 | 2,061 | +56                         |

TABLE B-65. --Lone drake index, southwest Manitoba, 1960 to 1964

[Expressed as percentage of total drakes]

| Year        | Mallard | Pintail | Canvasback |
|-------------|---------|---------|------------|
| <b>May:</b> |         |         |            |
| 1960 -----  | --      | --      | 78         |
| 1961 -----  | 45      | 34      | --         |
| 1962 -----  | 57      | 72      | 42         |
| 1963 -----  | 75      | 67      | 73         |
| 1964 -----  | 69      | 65      | 61         |

TABLE B-66.--Waterfowl breeding population, Alberta, 1963 and 1964

| Species                           | Total |       | 10-Year<br>Average | Percent change from-- |         |
|-----------------------------------|-------|-------|--------------------|-----------------------|---------|
|                                   | 1963  | 1964  |                    | 1963                  | Average |
| <b>Ducks:</b>                     |       |       |                    |                       |         |
| Dabblers:                         |       |       |                    |                       |         |
| Mallard -----                     | 1,265 | 1,146 | 1,695              | -9                    | -32     |
| Gadwall -----                     | 224   | 292   | 211                | +30                   | +38     |
| American widgeon --               | 311   | 360   | 427                | +16                   | -16     |
| Green-winged teal --              | 137   | 131   | 122                | --                    | +7      |
| Blue-winged teal <sup>1</sup> --- | 421   | 617   | 708                | +47                   | -13     |
| Shoveler -----                    | 404   | 432   | 525                | +7                    | -18     |
| Pintail -----                     | 767   | 579   | 1,808              | -25                   | -68     |
| Subtotal-----                     | 3,529 | 3,557 | 5,496              | +8                    | -35     |
| Divers:                           |       |       |                    |                       |         |
| Redhead -----                     | 111   | 163   | 136                | +47                   | +20     |
| Canvasback -----                  | 180   | 143   | 125                | -21                   | +14     |
| Scaup -----                       | 787   | 667   | 673                | -15                   | --      |
| Ring-necked duck --               | 1     | --    | --                 | --                    | --      |
| Goldeneye -----                   | 36    | 11    | --                 | -69                   | --      |
| Bufflehead -----                  | 37    | 23    | --                 | -38                   | --      |
| Ruddy duck -----                  | 132   | 90    | 54                 | -32                   | +67     |
| Subtotal-----                     | 1,284 | 1,097 | 988                | -15                   | +11     |
| <b>Miscellaneous:</b>             |       |       |                    |                       |         |
| Scoter -----                      | 6     | 32    | --                 | +433                  | --      |
| Unidentified -----                | 9     | 9     | --                 | --                    | --      |
| Total ducks -----                 | 4,828 | 4,695 | 6,484              | -3                    | -28     |
| Water areas (per sq. mi.)-----    | 8.8   | 5.6   | 8.4                | -36                   | -33     |

<sup>1</sup> Includes cinnamon teal.

TABLE B-67. --Waterfowl breeding population, Saskatchewan, 1963 and 1964

| Species                            | Total |       | Percent change from--<br>1963 |
|------------------------------------|-------|-------|-------------------------------|
|                                    | 1963  | 1964  |                               |
| <b>Ducks:</b>                      |       |       |                               |
| Dabblers:                          |       |       |                               |
| Mallard-----                       | 656   | 403   | -39                           |
| Gadwall-----                       | 193   | 95    | -51                           |
| American widgeon -----             | 184   | 151   | -18                           |
| Green-winged teal -----            | 15    | 15    | --                            |
| Blue-winged teal -----             | 204   | 257   | +26                           |
| Shoveler -----                     | 240   | 209   | -13                           |
| Pintail-----                       | 458   | 314   | -31                           |
| Subtotal -----                     | 1,950 | 1,444 | -26                           |
| Divers:                            |       |       |                               |
| Redhead -----                      | 35    | 49    | +40                           |
| Canvasback -----                   | 40    | 50    | +25                           |
| Scaup -----                        | 90    | 101   | +12                           |
| Subtotal -----                     | 165   | 200   | +21                           |
| Unidentified -----                 | 17    | 12    | --                            |
| Total ducks -----                  | 2,132 | 1,656 | -22                           |
| Water areas (per sq.<br>mi.) ----- | 6.9   | 7.0   | --                            |

TABLE B-68.--Waterfowl population indexes, eastern Ontario, Quebec, and Labrador, 1963 and 1964

| Species                 | 1963      | 1964      |
|-------------------------|-----------|-----------|
| Ducks:                  |           |           |
| Dabblers:               |           |           |
| Mallard -----           | 47,200    | 25,300    |
| Black duck -----        | 274,700   | 219,900   |
| American widgeon -----  | 4,000     | 5,700     |
| Green-winged teal ----- | 27,700    | 9,000     |
| Blue-winged teal -----  | --        | 2,600     |
| Pintail -----           | 19,500    | 10,800    |
| Wood duck -----         | --        | 3,900     |
| Subtotal -----          | 373,100   | 277,200   |
| Divers:                 |           |           |
| Redhead -----           | --        | --        |
| Canvasback -----        | 500       | --        |
| Scaup -----             | 39,400    | 41,300    |
| Ring-necked duck -----  | 28,300    | 15,400    |
| Goldeneye -----         | 77,300    | 166,000   |
| Bufflehead -----        | 64,100    | 15,100    |
| Ruddy duck-----         | --        | --        |
| Subtotal -----          | 209,600   | 237,800   |
| Miscellaneous:          |           |           |
| Scoter -----            | 50,600    | 7,600     |
| Merganser -----         | 346,000   | 421,500   |
| Oldsquaw -----          | --        | 3,200     |
| Subtotal -----          | 396,600   | 432,300   |
| Total ducks -----       | 979,300   | 947,300   |
| Canada goose -----      | 122,500   | 70,400    |
| Total waterfowl -----   | 1,101,800 | 1,017,700 |

TABLE B-69.--Percent lone drakes, eastern Ontario, Quebec, and Labrador, 1963 and 1964

|                                 | 1963 | 1964 |
|---------------------------------|------|------|
| Mixed boreal -----              | 23.0 | 65.8 |
| Main boreal -----               | 41.2 | 63.6 |
| Open boreal and forest tundra - | 47.6 | 78.6 |
| Average (all strata) -----      | 38.8 | 68.7 |

TABLE B-70.--Waterfowl population indexes by strata, eastern Ontario, Quebec, and Labrador, 1963 and 1964

| Species                 | Mixed boreal |         | Main boreal |         | Open boreal and forest tundra |         |
|-------------------------|--------------|---------|-------------|---------|-------------------------------|---------|
|                         | 1963         | 1964    | 1963        | 1964    | 1963                          | 1964    |
| <b>Ducks:</b>           |              |         |             |         |                               |         |
| <b>Dabblers:</b>        |              |         |             |         |                               |         |
| Mallard -----           | 19,200       | 10,100  | 23,300      | 11,000  | 4,700                         | 4,200   |
| Black duck -----        | 22,500       | 36,800  | 111,900     | 68,500  | 140,300                       | 114,600 |
| American widgeon -----  | 3,300        | --      | 700         | 1,500   | --                            | 4,200   |
| Green-winged teal ----- | 16,400       | 1,800   | 6,600       | 3,000   | 4,700                         | 4,200   |
| Blue-winged teal -----  | --           | 2,600   | --          | --      | --                            | --      |
| Pintail -----           | 2,800        | 4,100   | 6,300       | 4,600   | 10,400                        | 2,100   |
| Wood duck-----          | --           | 1,600   | --          | 2,300   | --                            | --      |
| Subtotal -----          | 64,200       | 57,000  | 148,800     | 90,900  | 160,100                       | 129,300 |
| <b>Divers:</b>          |              |         |             |         |                               |         |
| Redhead -----           | --           | --      | --          | --      | --                            | --      |
| Canvasback-----         | 500          | --      | --          | --      | --                            | --      |
| Scaup -----             | 12,300       | 10,400  | 16,700      | 13,000  | 10,400                        | 17,900  |
| Ring-necked duck -----  | 3,300        | 2,100   | 18,400      | 3,800   | 6,600                         | 9,500   |
| Goldeneye -----         | 4,300        | 3,600   | 20,900      | 36,200  | 52,100                        | 126,200 |
| Bufflehead -----        | 7,200        | 1,600   | 37,900      | 3,000   | 19,000                        | 10,500  |
| Ruddy duck -----        | --           | --      | --          | --      | --                            | --      |
| Subtotal -----          | 27,600       | 17,700  | 93,900      | 56,000  | 88,100                        | 164,100 |
| <b>Miscellaneous:</b>   |              |         |             |         |                               |         |
| Scoter -----            | --           | 500     | 4,200       | 800     | 46,400                        | 6,300   |
| Merganser -----         | 21,500       | 32,600  | 86,600      | 138,600 | 237,900                       | 250,300 |
| Oldsquaw -----          | --           | --      | --          | --      | --                            | 3,200   |
| Subtotal -----          | 21,500       | 33,100  | 90,800      | 139,400 | 284,300                       | 259,800 |
| Total ducks -----       | 113,300      | 107,800 | 333,500     | 286,300 | 532,500                       | 553,200 |
| Canada goose-----       | --           | --      | 26,800      | 4,200   | 95,700                        | 66,200  |
| Total waterfowl -----   | 113,300      | 107,800 | 360,300     | 290,500 | 628,200                       | 619,400 |

TABLE B-71. --Waterfowl brood and late-nesting indexes by Strata compared with previous year for eastern Ontario, Quebec, and Labrador, 1964

[ Index numbers in thousands]

| Species                        | Stratum      |             |             |               |        | Total         |              | Percent change from 1963 |
|--------------------------------|--------------|-------------|-------------|---------------|--------|---------------|--------------|--------------------------|
|                                | Mixed boreal | Main boreal | Open boreal | Forest tundra | Tundra | Previous year | Current year |                          |
| <b>Broods:</b>                 |              |             |             |               |        |               |              |                          |
| Duck brood index -----         | 2            | 37          | 5           | 1             | 1      | 150           | 46           | -69                      |
| Average brood size-----        | 5.33         | 5.46        | 4.83        | 4.75          | 3.00   | 5.24          | 5.04         | -4                       |
| <b>Late nesting index:</b>     |              |             |             |               |        |               |              |                          |
| <b>Dabblers:</b>               |              |             |             |               |        |               |              |                          |
| Mallard -----                  | 1            | 4           | --          | --            | --     | 4             | 5            | +25                      |
| Black duck -----               | 1            | 28          | 9           | 1             | 2      | 34            | 41           | +21                      |
| Gadwall -----                  | --           | --          | --          | --            | Trace  | --            | Trace        | +                        |
| Green-winged teal -----        | 1            | 4           | Trace       | --            | Trace  | 1             | 5            | +400                     |
| Blue-winged teal -----         | --           | --          | --          | --            | --     | --            | --           | --                       |
| Shoveler -----                 | --           | --          | --          | --            | --     | --            | --           | --                       |
| Pintail -----                  | --           | --          | Trace       | --            | Trace  | 1             | 1            | --                       |
| Subtotal -----                 | 3            | 36          | 10          | 1             | 3      | 40            | 53           | +25                      |
| <b>Divers:</b>                 |              |             |             |               |        |               |              |                          |
| Redhead -----                  | --           | --          | --          | --            | --     | --            | --           | --                       |
| Canvasback -----               | Trace        | --          | --          | --            | --     | --            | Trace        | --                       |
| Scaup -----                    | 2            | 13          | 1           | --            | 1      | 6             | 17           | +183                     |
| Ring-necked duck -----         | 1            | 1           | --          | --            | --     | 1             | 2            | +100                     |
| Goldeneye -----                | Trace        | 3           | 1           | --            | --     | 1             | 4            | +300                     |
| Bufflehead -----               | --           | --          | --          | --            | --     | 1             | --           | -100                     |
| Ruddy duck -----               | Trace        | --          | --          | --            | --     | --            | Trace        | --                       |
| Subtotal -----                 | 4            | 17          | 2           | --            | 1      | 9             | 24           | +167                     |
| <b>Miscellaneous:</b>          |              |             |             |               |        |               |              |                          |
| Scoter -----                   | --           | 1           | 4           | 1             | 1      | 6             | 7            | +17                      |
| Merganser -----                | 4            | 31          | 12          | 1             | 2      | 49            | 50           | +2                       |
| Subtotal -----                 | 4            | 32          | 16          | 2             | 3      | 55            | 57           | +4                       |
| Total ducks -----              | 11           | 85          | 28          | 3             | 7      | 104           | 134          | +29                      |
| Goose brood index -----        | --           | --          | 7           | 5             | 9      | 57            | 21           | -63                      |
| Average goose brood size ----- | --           | --          | 4.96        | 3.29          | 3.71   | 3.39          | 3.93         | +14                      |
| Late nesting index -----       | --           | 3           | 3           | 3             | 4      | 18            | 13           | -28                      |

C. WATERFOWL BANDING AND RECOVERY TABLES

TABLE C-1. --Mallard first hunting season recovery rates based on pre-hunting-season bandings, 1963

| Bander and location                          | Number banded |          | First hunting season recovery rate (percent) |          |
|--|---------------|----------|--|----------|
|  | Adult         | Immature | Adult  | Immature |
| Washington:                                  |               |          |  |          |
| McNary National Wildlife Refuge -----        | 69            | 238      | --   | 9.24     |
| Miscellaneous -----                          | 61            | 92       | --   | --       |
| Subtotal -----                               | 130           | 330      | 8.46   | 11.82    |
| Oregon:                                      |               |          |  |          |
| Malheur National Wildlife Refuge -----       | 144           | 287      | 0.69   | 7.66     |
| State Game Commission:                       |               |          |  |          |
| Sauvie Island -----                          | 186           | 815      | 10.22  | 25.77    |
| Miscellaneous -----                          | 65            | 61       | --   | --       |
| Subtotal -----                               | 395           | 1,163    | 7.34   | 22.01    |
| California:                                  |               |          |  |          |
| Tule Lake National Wildlife Refuge -----     | 756           | 390      | 5.95   | 5.38     |
| Modoc National Wildlife Refuge -----         | 24            | 192      | --   | 14.58    |
| Miscellaneous -----                          | 35            | 63       | --   | --       |
| Subtotal -----                               | 815           | 645      | 6.01   | 8.37     |
| Alberta:                                     |               |          |  |          |
| Ducks Unlimited:                             |               |          |  |          |
| Ministik Lake -----                          | 196           | 455      | 7.65   | 9.01     |
| Miscellaneous -----                          | 199           | --       | 4.02   | --       |
| Subtotal -----                               | 395           | 455      | 5.82   | 9.01     |
| Idaho:                                       |               |          |  |          |
| Minidoka National Wildlife Refuge -----      | 147           | 183      | 4.08   | 3.83     |
| Camas National Wildlife Refuge -----         | 451           | 89       | 5.32   | --       |
| Idaho Fish and Game:                         |               |          |  |          |
| North Lake Refuge -----                      | 245           | 27       | 4.49   | --       |
| Miscellaneous -----                          | 2             | 10       | --   | --       |
| Subtotal -----                               | 845           | 309      | 4.85   | 2.91     |
| Montana:                                     |               |          |  |          |
| National Bison Range -----                   | 232           | 424      | 5.60   | 7.31     |
| Fish and Game Department:                    |               |          |  |          |
| Freezeout Lake -----                         | 86            | 205      | --   | 4.39     |
| Bowdoin National Wildlife Refuge -----       | 648           | 389      | 4.01   | 3.08     |
| Medicine Lake National Wildlife Refuge ----- | 380           | 131      | 4.47   | 6.11     |
| Miscellaneous -----                          | 33            | 43       | --   | --       |
| Subtotal -----                               | 1,379         | 1,192    | 4.64   | 5.45     |

**TABLE C-1.--Mallard first hunting season recovery rates based on pre-hunting-season bandings, 1963 (continued)**

| Bander and location                   | Number banded |          | First hunting season recovery rate (percent) |          |
|---------------------------------------|---------------|----------|--|----------|
|                                       | Adult         | Immature | Adult  | Immature |
| Nevada:                               |               |          |  |          |
| Ruby Lake National Wildlife Refuge -  | 310           | 292      | 6.45   | 4.79     |
| Miscellaneous -----                   | 0             | 14       | --   | --       |
| Subtotal -----                        | 310           | 306      | 6.45   | 5.56     |
| Utah:                                 |               |          |  |          |
| Fish and Game Commission:             |               |          |  |          |
| Corinne area -----                    | 75            | 116      | --   | 0.00     |
| Other locations -----                 | 65            | 128      | --   | 10.16    |
| Subtotal -----                        | 140           | 244      | 2.14   | 5.33     |
| Saskatchewan:                         |               |          |  |          |
| E. M. Bosak:                          |               |          |  |          |
| Mud Lake -----                        | 35            | 150      | --   | 10.67    |
| Murray Lake -----                     | 133           | 154      | 3.76   | 3.25     |
| Jackfish Lake -----                   | 381           | 171      | 4.46   | 4.68     |
| Blackfoot Lake -----                  | 124           | 150      | 2.42   | 8.00     |
| Miscellaneous -----                   | 84            | 24       | --   | --       |
| Subtotal -----                        | 757           | 649      | 3.43   | 6.63     |
| North Dakota:                         |               |          |  |          |
| Upper Souris National Wildlife Refuge | 919           | 717      | 4.79   | 5.02     |
| Lower Souris National Wildlife Refuge | 1,018         | 195      | 3.93   | 7.69     |
| Miscellaneous -----                   | 5             | 0        | --   | --       |
| Subtotal -----                        | 1,942         | 912      | 4.43   | 5.59     |
| South Dakota:                         |               |          |  |          |
| Sand Lake National Wildlife Refuge -  | 612           | 398      | 3.76   | 4.02     |
| L. J. Reynoldson:                     |               |          |  |          |
| Several locations -----               | 4             | 123      | --   | 4.06     |
| Subtotal -----                        | 616           | 521      | 3.73   | 4.03     |
| Colorado:                             |               |          |  |          |
| Game and Fish Department:             |               |          |  |          |
| Jackson County -----                  | 156           | 0        | 5.77   | --       |
| Monte Vista National Wildlife Refuge  | 554           | 931      | 6.14   | 7.73     |
| Subtotal -----                        | 710           | 931      | 6.06   | 7.73     |
| Manitoba:                             |               |          |  |          |
| Ducks Unlimited:                      |               |          |  |          |
| Libau Marsh -----                     | 25            | 101      | --   | 12.87    |
| Delta Research Station -----          | 96            | 261      | --   | 8.43     |
| Morton Smith:                         |               |          |  |          |
| Saskeram River -----                  | 145           | 70       | 2.76   | --       |
| Birch River -----                     | 630           | 184      | 3.97   | 7.07     |
| Miscellaneous -----                   | 14            | 2        | --   | --       |
| Subtotal -----                        | 910           | 618      | 3.85   | 8.74     |

TABLE C-1. --Mallard first hunting season recovery rates based on pre-hunting-season bandings, 1963 (continued)

| Bander and location                              | Number banded |              | First hunting season recovery rate (percent) |              |
|--|---------------|--------------|--|--------------|
|  | Adult         | Immature     | Adult  | Immature     |
| <b>Minnesota:</b>                                |               |              |  |              |
| Rice Lake National Wildlife Refuge               | 35            | 166          | --   | 8.43         |
| Agassiz National Wildlife Refuge -               | 721           | 1,208        | 6.10   | 10.02        |
| Tamarac National Wildlife Refuge -               | 161           | 77           | 3.11   | --           |
| Division of Game and Fish:                       |               |              |  |              |
| Roseau River -----                               | 287           | 1,627        | 7.67   | 12.29        |
| Miscellaneous -----                              | 45            | 17           | --   | --           |
| <b>Subtotal -----</b>                            | <b>1,249</b>  | <b>3,095</b> | <b>6.33</b>                                  | <b>11.02</b> |
| <b>Iowa:</b>                                     |               |              |  |              |
| Upper Mississippi National Wildlife Refuge ----- | 6             | 189          | --   | 10.58        |
| Miscellaneous -----                              | 75            | 54           | --   | --           |
| <b>Subtotal -----</b>                            | <b>81</b>     | <b>243</b>   | <b>--</b>                                    | <b>10.60</b> |
| <b>Missouri:</b>                                 |               |              |  |              |
| Conservation Commission:                         |               |              |  |              |
| Clarksville area -----                           | 74            | 145          | --   | 10.34        |
| Miscellaneous -----                              | 17            | 31           | --   | --           |
| <b>Subtotal -----</b>                            | <b>91</b>     | <b>176</b>   | <b>--</b>                                    | <b>9.66</b>  |
| <b>Wisconsin:</b>                                |               |              |  |              |
| Horicon National Wildlife Refuge -               | 1,670         | 1,247        | 6.89   | 14.19        |
| Upper Mississippi National Wildlife Refuge ----- | 0             | 521          | --   | 9.40         |
| Conservation Department:                         |               |              |  |              |
| Cresc Meadow -----                               | 274           | 133          | 6.93   | 15.04        |
| Miscellaneous -----                              | 23            | 49           | --   | --           |
| <b>Subtotal -----</b>                            | <b>1,967</b>  | <b>1,970</b> | <b>6.86</b>                                  | <b>12.89</b> |
| <b>Michigan:</b>                                 |               |              |  |              |
| Saginaw National Wildlife Refuge                 | 324           | 1,001        | 7.00   | 7.21         |
| Conservation Department:                         |               |              |  |              |
| Rose Lake -----                                  | 2             | 140          | --   | 18.57        |
| Miscellaneous -----                              | 39            | 120          | --   | 12.50        |
| <b>Subtotal -----</b>                            | <b>365</b>    | <b>1,261</b> | <b>6.85</b>                                  | <b>9.04</b>  |
| <b>Indiana:</b>                                  |               |              |  |              |
| Department of Conservation -----                 | 22            | 124          | --   | 4.03         |
| <b>Ohio:</b>                                     |               |              |  |              |
| Division of Wildlife -----                       | 98            | 255          | --   | 9.80         |
| Miscellaneous -----                              | 0             | 3            | --   | --           |
| <b>Subtotal -----</b>                            | <b>98</b>     | <b>258</b>   | <b>--</b>                                    | <b>9.69</b>  |
| <b>Ontario:</b>                                  |               |              |  |              |
| D. H. T. Hussell:                                |               |              |  |              |
| Norfolk County -----                             | 48            | 122          | --   | 9.84         |

TABLE C-1. --Mallard first hunting season recovery rates based on pre-hunting-season bandings, 1963 (continued)

| Bander and location                        | Number banded |          | First hunting season recovery rate (percent) |          |
|--|---------------|----------|--|----------|
|  | Adult         | Immature | Adult  | Immature |
| Ontario: (cont'd)                          |               |          |  |          |
| A. T. Cringen:                             |               |          |  |          |
| Guelph -----                               | 14            | 133      | --   | 15.79    |
| J. H. Buckalew:                            |               |          |  |          |
| Fort Francis -----                         | 20            | 311      | --   | 7.72     |
| Miscellaneous -----                        | 70            | 210      | --   | 9.52     |
| Subtotal -----                             | 152           | 776      | 9.21   | 9.92     |
| New York:                                  |               |          |  |          |
| Conservation Department:                   |               |          |  |          |
| Howlands Island -----                      | 181           | 359      | 6.08   | 10.58    |
| Oak Orchard -----                          | 55            | 610      | --   | 7.70     |
| Perch Lake -----                           | 142           | 774      | 2.82   | 6.98     |
| Wilson Hill -----                          | 211           | 45       | 5.69   | --       |
| Miscellaneous -----                        | 91            | 119      | --   | 14.28    |
| Subtotal -----                             | 680           | 1,907    | 5.15   | 8.39     |
| Vermont:                                   |               |          |  |          |
| Fish and Game Department:                  |               |          |  |          |
| Dead Creek -----                           | 100           | 244      | 2.00   | 8.61     |
| Miscellaneous -----                        | 24            | 28       | --   | --       |
| Subtotal -----                             | 124           | 272      | 4.03   | 8.46     |
| Pennsylvania:                              |               |          |  |          |
| Game Commission:                           |               |          |  |          |
| Pymatuning Reservoir -----                 | 597           | 395      | 3.02   | 3.70     |
| Delaware:                                  |               |          |  |          |
| Bombay Hook National Wildlife Refuge ----- | 253           | 94       | 3.95   | --       |

TABLE C-2. -- Black duck first hunting season recovery rates based on pre-hunting-season bandings, 1963

| Bander and location  | Number banded |          | First hunting season recovery rate (percent) |          |
|--|---------------|----------|--|----------|
|  | Adult         | Immature | Adult  | Immature |
| Wisconsin:<br>All locations -----  | 113           | 112      | 5.31   | 9.82     |
| Michigan:<br>All locations -----   | 59            | 144      | --   | 9.72     |
| Ontario:<br>E. Kroll:<br>Oshawa -----  | 61            | 113      | --   | 10.62    |
| E. H. Stone:<br>Arm Lake -----   | 13            | 131      | --   | 6.87     |
| D. J. Gawley:<br>Gogama -----  | 20            | 190      | --   | 12.63    |
| Miscellaneous -----  | 40            | 124      | --   | 12.10    |
| Subtotal -----   | 134           | 558      | 13.43  | 10.75    |
| Quebec:<br>Gaston Moisan:<br>St. Methode -----   | 30            | 104      | --   | 14.42    |
| Nova Scotia:<br>F. J. Payne:<br>Argyle -----   | 28            | 179      | --   | 11.17    |
| Hollahans Lake -----   | 51            | 234      | --   | 10.26    |
| Miscellaneous -----  | 20            | 101      | --   | 14.85    |
| Subtotal -----   | 99            | 514      | --   | 11.48    |
| New York:<br>Conservation Department:<br>Howlands Island -----                         | 73            | 149      | --   | 14.09    |
| Perch Lake -----   | 200           | 847      | 7.50   | 9.56     |
| Wilson Hill -----  | 154           | 90       | 10.39  | --       |
| Oak Orchard -----  | 0             | 142      | --   | 7.75     |
| Miscellaneous -----  | 78            | 75       | --   | --       |
| Subtotal -----   | 505           | 1,303    | 7.52   | 10.36    |
| Maine:<br>O. E. Seelye:<br>Turner Bridge-----  | 33            | 308      | --   | 9.42     |
| E. J. Baker:<br>Several locations -----  | 30            | 112      | --   | 8.04     |
| Moosehorn National Wildlife Refuge<br>Coop. Unit and State:<br>Several locations ----- | 59            | 293      | --   | 3.75     |
| Subtotal -----   | 158           | 904      | 6.96   | 9.29     |
| Vermont:<br>Missiquoi National Wildlife Refuge<br>Fish and Game:<br>Dead Creek-----    | 280           | 1,617    | 6.79   | 8.91     |
|  | 103           | 97       | 7.77   | --       |
|  | 19            | 168      | --   | 11.90    |

TABLE C-2.--Black duck first hunting season recovery rates based on pre-hunting-season bandings, 1963 (continued)

| Bander and location                         | Number banded |          | First hunting season recovery rate (percent) |          |
|---|---------------|----------|--|----------|
|   | Adult         | Immature | Adult  | Immature |
| Vermont: (cont'd)                           |               |          |  |          |
| Bruce Parker:                               |               |          |  |          |
| Lake Memphremagog -----                     | 27            | 122      | --   | 10.66    |
| Miscellaneous -----                         | 10            | 42       | --   | --       |
| Subtotal -----                              | 159           | 429      | 7.55   | 12.59    |
| Massachusetts:                              |               |          |  |          |
| Parker River National Wildlife Refuge ----- | 130           | 190      | 9.23   | 4.74     |

**TABLE C-3.--A comparison of mallard first hunting season recovery rates from pre-hunting-season bandings, 1959-63<sup>1</sup>**

| Bander and location                                  | Adult |      |      |      |      | Immature |      |      |      |      |
|--|-------|------|------|------|------|----------|------|------|------|------|
|  | 1959  | 1960 | 1961 | 1962 | 1963 | 1959     | 1960 | 1961 | 1962 | 1963 |
| Pacific Flyway:                                      |       |      |      |      |      |          |      |      |      |      |
| Oregon:  |       |      |      |      |      |          |      |      |      |      |
| Malheur National Wildlife Refuge -----               | --    | 5.6  | 5.7  | 3.2  | 0.7  | --       | 6.3  | 5.1  | 2.5  | 7.7  |
| Game Commission:                                     |       |      |      |      |      |          |      |      |      |      |
| Sauvie Island -----                                  | 19.8  | 17.9 | 10.0 | 10.8 | 10.2 | 23.8     | 25.6 | 18.7 | 23.7 | 25.8 |
| California:  |       |      |      |      |      |          |      |      |      |      |
| Tule Lake National Wildlife Refuge -----             | 6.7   | 7.7  | 6.6  | 5.1  | 6.0  | 15.9     | 13.9 | 14.7 | 13.6 | 5.4  |
| Idaho:   |       |      |      |      |      |          |      |      |      |      |
| Fish and Game:                                       |       |      |      |      |      |          |      |      |      |      |
| North Lake -----                                     | --    | --   | --   | --   | 4.5  | --       | --   | --   | --   | --   |
| Minidoka National Wildlife Refuge -----              | --    | --   | --   | 4.9  | 4.1  | --       | --   | --   | 4.8  | 3.8  |
| Camas National Wildlife Refuge -----                 | --    | 4.5  | 4.2  | 2.5  | 5.3  | --       | --   | --   |      |      |
| Montana:   |       |      |      |      |      |          |      |      |      |      |
| Ninepipe National Wildlife Refuge <sup>2</sup> ----- | 3.7   | 5.8  | 8.8  | 8.2  | 5.6  | 13.9     | 10.5 | 11.3 | 6.7  | 7.3  |
| Nevada:  |       |      |      |      |      |          |      |      |      |      |
| Ruby Lake National Wildlife Refuge -----             | --    | 7.7  | 7.4  | 3.8  | 6.4  | --       | --   | 9.0  | 7.0  | 4.8  |
| Central Flyway:                                      |       |      |      |      |      |          |      |      |      |      |
| Montana:   |       |      |      |      |      |          |      |      |      |      |
| Bowdoin National Wildlife Refuge -----               | --    | --   | --   | 1.4  | 4.0  | --       | --   | --   | 1.3  | 3.1  |
| Medicine Lake National Wildlife Refuge -----         | 6.5   | 4.8  | 3.1  | 0.8  | 4.5  | --       | 5.4  | --   | 3.0  | 6.1  |
| North Dakota:  |       |      |      |      |      |          |      |      |      |      |
| Upper Souris National Wildlife Refuge -----          | --    | --   | 4.3  | 2.9  | 4.8  | --       | --   | 6.4  | 0.8  | 5.0  |
| Lower Souris National Wildlife Refuge -----          | 4.7   | 7.1  | 5.1  | 1.8  | 3.9  | --       | 8.0  | 8.7  | 2.2  | 7.7  |
| South Dakota:  |       |      |      |      |      |          |      |      |      |      |
| Sand Lake National Wildlife Refuge -----             | --    | 8.3  | 3.8  | 1.8  | 3.8  | --       | 7.1  | 3.6  | 4.8  | 4.0  |
| Mississippi Flyway:                                  |       |      |      |      |      |          |      |      |      |      |
| Minnesota:   |       |      |      |      |      |          |      |      |      |      |
| Rice Lake National Wildlife Refuge -----             | 13.0  | 10.7 | --   | 5.7  | --   | 14.5     | 13.6 | 5.0  | 8.3  | 8.4  |
| Agassiz National Wildlife Refuge -----               | 8.6   | 8.3  | 4.2  | 2.7  | 6.1  | 11.5     | 18.5 | 7.3  | 7.2  | 10.0 |
| Wisconsin:   |       |      |      |      |      |          |      |      |      |      |
| Horicon National Wildlife Refuge -----               | --    | --   | 4.1  | 5.9  | 6.9  | --       | --   | 10.0 | 10.5 | 14.2 |
| Michigan:  |       |      |      |      |      |          |      |      |      |      |
| Shiawassee National Wildlife Refuge -----            | --    | --   | 8.2  | 4.1  | 7.0  | 12.1     | 15.3 | 8.3  | 6.3  | 7.2  |

TABLE C-3.--A comparison of mallard first hunting season recovery rates from pre-hunting-season bandings, 1959-63<sup>1</sup> (continued)

| Bander and location          | Adult |      |      |      |      | Immature |      |      |      |      |
|------------------------------|-------|------|------|------|------|----------|------|------|------|------|
|                              | 1959  | 1960 | 1961 | 1962 | 1963 | 1959     | 1960 | 1961 | 1962 | 1963 |
| Mississippi Flyway: (cont'd) |       |      |      |      |      |          |      |      |      |      |
| Ohio:                        |       |      |      |      |      |          |      |      |      |      |
| Division of Wildlife:        |       |      |      |      |      |          |      |      |      |      |
| Several locations -----      | --    | --   | --   | 4.5  | --   | --       | --   | --   | 4.7  | 9.8  |
| Atlantic Flyway:             |       |      |      |      |      |          |      |      |      |      |
| New York:                    |       |      |      |      |      |          |      |      |      |      |
| Conservation Department:     |       |      |      |      |      |          |      |      |      |      |
| Howlands Island -----        | --    | --   | --   | --   | 6.1  | --       | 8.3  | 11.5 | 6.3  | 10.6 |
| Oak Orchard -----            | --    | --   | --   | --   | --   | --       | --   | --   | 14.5 | 7.7  |
| Perch Lake -----             | --    | --   | --   | --   | 2.8  | 11.1     | 13.8 | 12.7 | 7.8  | 7.0  |
| Wilson Hill -----            | --    | --   | --   | 7.0  | 5.7  | --       | --   | --   | 16.2 | --   |
| Canada                       |       |      |      |      |      |          |      |      |      |      |
| Alberta:                     |       |      |      |      |      |          |      |      |      |      |
| All locations -----          | --    | 5.9  | --   | 7.7  | 5.8  | --       | --   | 8.0  | 7.5  | 9.0  |
| Saskatchewan:                |       |      |      |      |      |          |      |      |      |      |
| All locations -----          | --    | 4.4  | --   | 5.0  | 3.4  | --       | --   | 6.1  | 6.1  | 6.6  |
| Manitoba:                    |       |      |      |      |      |          |      |      |      |      |
| All locations -----          | --    | 6.4  | --   | 5.9  | 3.8  | --       | --   | 7.8  | 8.6  | 8.7  |
| Ontario:                     |       |      |      |      |      |          |      |      |      |      |
| Guelph -----                 | --    | --   | --   | --   | --   | --       | --   | 14.6 | 17.3 | 15.8 |

<sup>1</sup>No rates from bandings less than 100 birds were included.

<sup>2</sup>Nineteen sixty-three bandings by National Bison Range permit.

**TABLE C-4. --A comparison of mallard relative recovery rates from pre-hunting-season bandings of adult and immature birds, 1959-63<sup>1</sup>**

| Bander and location                          | 1959 | 1960 | 1961 | 1962 | 1963 |
|--|------|------|------|------|------|
| <b>Pacific Flyway:</b>                       |      |      |      |      |      |
| Oregon:                                      |      |      |      |      |      |
| Malheur National Wildlife Refuge -----       | --   | --   | 0.9  | 0.8  | 11.1 |
| Sauvie Island -----                          | 1.2  | 1.4  | 1.9  | 2.2  | 2.5  |
| California:                                  |      |      |      |      |      |
| Tule Lake National Wildlife Refuge -----     | 2.4  | 1.8  | 2.2  | 2.7  | 0.9  |
| Idaho:                                       |      |      |      |      |      |
| Minidoka National Wildlife Refuge-----       | --   | --   | --   | 1.0  | 0.9  |
| Montana <sup>2</sup> :                       |      |      |      |      |      |
| Ninepipe National Wildlife Refuge -----      | --   | --   | 1.3  | 0.8  | 1.3  |
| Nevada:                                      |      |      |      |      |      |
| Ruby Lake National Wildlife Refuge-----      | --   | --   | 1.2  | 1.9  | 0.7  |
| <b>Central Flyway:</b>                       |      |      |      |      |      |
| Montana:                                     |      |      |      |      |      |
| Bowdoin National Wildlife Refuge -----       | 1.2  | 0.6  | --   | 1.0  | 0.8  |
| Medicine Lake National Wildlife Refuge ----- | --   | 1.1  | --   | 3.6  | 1.4  |
| North Dakota:                                |      |      |      |      |      |
| Upper Souris National Wildlife Refuge -----  | --   | --   | --   | --   | 1.0  |
| Lower Souris National Wildlife Refuge-----   | --   | 1.4  | 1.7  | 1.2  | 2.0  |
| South Dakota:                                |      |      |      |      |      |
| Sand Lake National Wildlife Refuge -----     | --   | 0.8  | 0.9  | 2.7  | 1.1  |
| Colorado:                                    |      |      |      |      |      |
| Monte Vista National Wildlife Refuge-----    | --   | --   | --   | --   | 1.2  |
| <b>Mississippi Flyway:</b>                   |      |      |      |      |      |
| Minnesota:                                   |      |      |      |      |      |
| Agassiz National Wildlife Refuge -----       | 1.3  | 2.2  | 1.7  | 2.7  | 1.6  |
| Roseau River -----                           | --   | --   | --   | --   | 1.6  |
| Wisconsin:                                   |      |      |      |      |      |
| Horicon National Wildlife Refuge -----       | --   | --   | 2.4  | 1.9  | 2.0  |
| Crex Meadows -----                           | --   | --   | --   | --   | 2.2  |
| Michigan:                                    |      |      |      |      |      |
| Shiawassee National Wildlife Refuge -----    | --   | --   | 1.0  | 1.5  | 1.0  |
| <b>Atlantic Flyway:</b>                      |      |      |      |      |      |
| New York:                                    |      |      |      |      |      |
| Howlands Island -----                        | --   | 1.4  | 2.0  | 1.4  | 1.7  |
| Perch Lake -----                             | 1.9  | 1.6  | 1.1  | 1.3  | 2.5  |
| Canada:                                      |      |      |      |      |      |
| Alberta:                                     |      |      |      |      |      |
| Ministik Lake -----                          | --   | --   | --   | 1.2  | 1.2  |
| Saskatchewan Provincial total -----          | --   | --   | --   | 1.2  | 1.9  |
| Manitoba Provincial total -----              | --   | --   | --   | 1.4  | 2.3  |

<sup>1</sup> Relative recovery rate =  $\frac{\text{immature recovery rate}}{\text{adult recovery rate}}$ .

<sup>2</sup> Nineteen sixty three bandings on National Bison Range permit.

TABLE C-5.--Regional differences in recovery rates of mallards from 1963 pre-hunting-season bandings in Central and Mississippi Flyways

| Banding location                                    | Number banded |          | Area of recovery   | Recovery rate |          | Relative recovery rate |
|---|---------------|----------|--|---------------|----------|------------------------|
|   | Adult         | Immature |  | Adult         | Immature |                        |
| Upper and Lower Souris National Wildlife Refuges -- | 1,937         | 802      | Canada, North Dakota, South Dakota, Minnesota.   | 1.86          | 2.74     | 1.47                   |
|   |               |          | Wyoming, Nebraska, Kansas, Iowa, Missouri, Illinois, Indiana, Wisconsin, Michigan, Maryland, Kentucky. | 1.08          | 1.12     | 1.04                   |
|   |               |          | New Mexico, Texas, Arkansas, Louisiana, Mississippi, South Carolina.                                   | 1.39          | 2.49     | 1.79                   |
| Agassiz National Wildlife Refuge -----              | 721           | 1,208    | Minnesota, North Dakota, Prairie Provinces   | 2.36          | 6.87     | 2.91                   |
|   |               |          | South Dakota, Wisconsin, Michigan, Iowa, Kentucky, Missouri, Illinois, Ontario                         | 2.22          | 2.65     | 1.19                   |
|   |               |          | Alabama, Arkansas, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Texas             | 1.52          | 0.50     | 0.33                   |
| Horicon National Wildlife Refuge -----              | 1,670         | 1,247    | Wisconsin  | 4.67          | 11.71    | 2.51                   |
|   |               |          | Rest of Mississippi Flyway   | 2.04          | 2.24     | 1.10                   |
|   |               |          | Atlantic Flyway  | 0.18          | 0.24     | 1.33                   |
| Shiawassee National Wildlife Refuge -----           | 324           | 1,001    | Michigan, Wisconsin, Ontario, Minnesota  | 4.01          | 4.20     | 1.05                   |
|   |               |          | Illinois, Pennsylvania, Iowa, Indiana, New Jersey, Ohio, Virginia                                      | 0.92          | 1.40     | 1.52                   |
|   |               |          | Florida, South Carolina, Tennessee   | 2.16          | 1.70     | 0.79                   |

TABLE C-6.--Recovery rates of male and female mallards from 1963 pre-hunting-season bandings

[Recoveries in Canada excluded]

| State and location                       | Adult                      |        |                        |                            | Immature |                        |  |  |
|--|----------------------------|--------|------------------------|----------------------------|----------|------------------------|--|--|
|  | Recovery rate<br>(percent) |        | Males<br>per<br>Female | Recovery rate<br>(percent) |          | Males<br>per<br>Female |  |  |
|  | Male                       | Female |                        | Male                       | Female   |                        |  |  |
| Pacific Flyway:                          |                            |        |                        |                            |          |                        |  |  |
| Washington:                              |                            |        |                        |                            |          |                        |  |  |
| McNary National Wildlife Refuge -----    | --                         | --     | --                     | 10.66                      | 7.66     | 1.4                    |  |  |
| Oregon:                                  |                            |        |                        |                            |          |                        |  |  |
| Malheur National Wildlife Refuge -----   | --                         | --     | --                     | 9.64                       | 4.96     | 1.9                    |  |  |
| Sauvie Island-----                       | --                         | --     | --                     | 28.25                      | 23.37    | 1.2                    |  |  |
| California:                              |                            |        |                        |                            |          |                        |  |  |
| Tule Lake National Wildlife Refuge ----- | --                         | --     | --                     | 6.06                       | 4.40     | 1.4                    |  |  |
| Idaho:                                   |                            |        |                        |                            |          |                        |  |  |
| Camas National Wildlife Refuge -----     | 6.48                       | 3.92   | 1.6                    | --                         | --       | --                     |  |  |
| Montana:                                 |                            |        |                        |                            |          |                        |  |  |
| National Bison Range -----               | --                         | --     | --                     | 7.87                       | 6.37     | 1.2                    |  |  |
| Nevada:                                  |                            |        |                        |                            |          |                        |  |  |
| Ruby Lake National Wildlife Refuge-----  | 5.88                       | 6.81   | 0.9                    | 6.33                       | 2.99     | 2.1                    |  |  |
| Central Flyway:                          |                            |        |                        |                            |          |                        |  |  |
| Montana:                                 |                            |        |                        |                            |          |                        |  |  |
| Bowdoin National Wildlife Refuge -----   | 4.52                       | 0.72   | 6.3                    | 3.61                       | 0.71     | 5.1                    |  |  |
| Medicine Lake National Wildlife Refuge - | 6.31                       | 2.20   | 2.9                    | --                         | --       | --                     |  |  |
| North Dakota:                            |                            |        |                        |                            |          |                        |  |  |
| Upper Souris National Wildlife Refuge -- | 6.22                       | 3.20   | 1.9                    | 6.62                       | 3.25     | 2.0                    |  |  |
| Lower Souris National Wildlife Refuge -- | 4.30                       | 1.46   | 2.9                    | --                         | --       | --                     |  |  |
| South Dakota:                            |                            |        |                        |                            |          |                        |  |  |
| Sand Lake National Wildlife Refuge ----- | 5.91                       | 2.82   | 2.1                    | 6.81                       | 1.45     | 4.7                    |  |  |
| Colorado:                                |                            |        |                        |                            |          |                        |  |  |
| Monte Vista National Wildlife Refuge---  | 3.90                       | 7.74   | 0.5                    | 7.87                       | 7.48     | 1.0                    |  |  |
| Mississippi Flyway:                      |                            |        |                        |                            |          |                        |  |  |
| Minnesota:                               |                            |        |                        |                            |          |                        |  |  |
| Agassiz National Wildlife Refuge -----   | 5.42                       | 6.06   | 0.9                    | 8.79                       | 11.09    | 0.8                    |  |  |
| Roseau River -----                       | 6.56                       | 8.48   | 0.8                    | 12.56                      | 9.00     | 1.4                    |  |  |
| Wisconsin:                               |                            |        |                        |                            |          |                        |  |  |
| Horicon National Wildlife Refuge -----   | 7.88                       | 6.30   | 1.2                    | 15.27                      | 13.24    | 1.2                    |  |  |
| Michigan:                                |                            |        |                        |                            |          |                        |  |  |
| Shiawassee National Wildlife Refuge ---  | --                         | --     | --                     | 6.63                       | 5.39     | 1.2                    |  |  |
| Atlantic Flyway:                         |                            |        |                        |                            |          |                        |  |  |
| New York:                                |                            |        |                        |                            |          |                        |  |  |
| Howlands Island-----                     | --                         | --     | --                     | 10.59                      | 10.05    | 1.0                    |  |  |
| Oak Orchard -----                        | --                         | --     | --                     | 8.21                       | 5.34     | 1.5                    |  |  |
| Perch Lake-----                          | --                         | --     | --                     | 6.23                       | 4.80     | 1.3                    |  |  |

TABLE C-6.--Recovery rates of male and female mallards from 1963 pre-hunting-season bandings (continued)

[ Recoveries in Canada excluded ]

| State and location               | Adult                      |        |                        |      | Immature                   |      |                        |  |
|----------------------------------|----------------------------|--------|------------------------|------|----------------------------|------|------------------------|--|
|                                  | Recovery rate<br>(percent) |        | Males<br>per<br>Female | Male | Recovery rate<br>(percent) |      | Males<br>per<br>Female |  |
|                                  | Male                       | Female |                        |      | Female                     | Male |                        |  |
| <b>Atlantic Flyway: (cont'd)</b> |                            |        |                        |      |                            |      |                        |  |
| Vermont:                         |                            |        |                        |      |                            |      |                        |  |
| Dead Creek -----                 | --                         | --     | --                     | --   | 9.01                       | 5.26 | 1.7                    |  |
| Pennsylvania:                    |                            |        |                        |      |                            |      |                        |  |
| Pymatuning Reservoir -----       | 5.05                       | 2.01   | 2.5                    | 2.58 | 4.58                       | 0.6  |                        |  |

TABLE C-7.--Comparison of black duck first hunting season recovery rates, 1959 to 1963

| Location of banding                         | Adult |      |      |      |      | Immature |      |      |      |      |
|---|-------|------|------|------|------|----------|------|------|------|------|
|   | 1959  | 1960 | 1961 | 1962 | 1963 | 1959     | 1960 | 1961 | 1962 | 1963 |
| Ontario:                                    |       |      |      |      |      |          |      |      |      |      |
| Oshawa -----                                | --    | --   | --   | --   | --   | --       | --   | 13.6 | 13.0 | 10.6 |
| New York:                                   |       |      |      |      |      |          |      |      |      |      |
| Perch Lake -----                            | 6.6   | 11.5 | --   | 7.8  | 7.5  | 9.9      | 13.6 | 14.0 | 8.3  | 9.6  |
| Oak Orchard -----                           | --    | --   | --   | --   | --   | --       | --   | 7.3  | 10.9 | 7.6  |
| Wilson Hill -----                           | 8.1   | 15.3 | 7.5  | 8.4  | 10.4 | 11.8     | 18.1 | 9.0  | 12.7 | --   |
| Maine:                                      |       |      |      |      |      |          |      |      |      |      |
| Coop. Unit & State:                         |       |      |      |      |      |          |      |      |      |      |
| (Several locations) -----                   | --    | --   | --   | 8.8  | 7.0  | --       | --   | --   | 10.6 | 9.3  |
| E. J. Baker:                                |       |      |      |      |      |          |      |      |      |      |
| (Richmond) -----                            | --    | --   | --   | --   | --   | --       | --   | --   | 10.8 | 8.0  |
| Moosehorn National Wildlife Refuge -----    | --    | --   | --   | --   | --   | --       | --   | 5.5  | 6.9  | 3.4  |
| Vermont:                                    |       |      |      |      |      |          |      |      |      |      |
| Mississquoi National Wildlife Refuge -----  | --    | --   | --   | 14.0 | 7.8  | --       | --   | --   | 8.7  | --   |
| Massachusetts:                              |       |      |      |      |      |          |      |      |      |      |
| Parker River National Wildlife Refuge ----- | --    | --   | --   | --   | 9.2  | --       | --   | 8.9  | 9.9  | 4.7  |

TABLE C-8. --Black duck relative recovery rates from pre-hunting-season bandings of adult and immature birds, 1959 to 1963

$$[ \text{Relative recovery rate} = \frac{\text{immature recovery rate}}{\text{adult recovery rate}} ]$$

| Location of banding                        | 1959 | 1960 | 1961 | 1962 | 1963 |
|--|------|------|------|------|------|
| Wisconsin:                                 |      |      |      |      |      |
| All locations -----                        | --   | --   | --   | --   | 1.8  |
| Ontario:                                   |      |      |      |      |      |
| All locations -----                        | --   | --   | --   | --   | 0.8  |
| New York:                                  |      |      |      |      |      |
| Perch Lake-----                            | 1.5  | 1.8  | 2.3  | 1.1  | 1.3  |
| All locations -----                        | --   | --   | --   | --   | 1.4  |
| Maine:                                     |      |      |      |      |      |
| Coop. Unit & State -----                   | --   | --   | --   | 1.2  | 1.3  |
| All locations -----                        | --   | --   | --   | --   | 1.3  |
| Vermont:                                   |      |      |      |      |      |
| All locations -----                        | --   | --   | --   | --   | 1.7  |
| Massachusetts:                             |      |      |      |      |      |
| Parker River National Wildlife Refuge----- | --   | --   | --   | --   | 0.5  |

TABLE C-9.--Regional differences in the recovery rates of black ducks from 1963 pre-hunting-season bandings in Maine and New York

| Banding location | Adult | Immature | Area of recovery                                    | Recovery rate (percent) |          | Relative recovery rate |
|------------------|-------|----------|---|-------------------------|----------|------------------------|
|                  |       |          |   | Adult                   | Immature |                        |
| Maine -----      | 280   | 1,617    | Maine, New Hampshire, Vermont, New York, and Canada | 4.28                    | 6.00     | 1.40                   |
|                  |       |          | South   | 2.50                    | 2.91     | 1.16                   |
| New York -----   | 505   | 1,303    | New York, and North                                 | 3.96                    | 7.75     | 1.96                   |
|                  |       |          | South of New York                                   | 3.56                    | 2.61     | 0.73                   |

TABLE C-10.--Pre-hunting-season bandings and first hunting season recovery rates of blue-winged teal, 1963

| Banding location      | Number banded |          | Number of recoveries |          | First hunting season recovery rate (percent) |          |
|-----------------------|---------------|----------|----------------------|----------|--|----------|
|                       | Adults        | Immature | Adults               | Immature | Adults                                       | Immature |
| Canada:               |               |          |                      |          |  |          |
| Alberta:              |               |          |                      |          |  |          |
| Vermilion-Camrose --- | 757           | 241      | 6                    | 3        | 0.79   | 1.24     |
| Saskatchewan:         |               |          |                      |          |  |          |
| Yorkton-Regina -----  | 353           | 706      | 3                    | 18       | 0.85   | 2.55     |
| Prince Albert-N.      |               |          |                      |          |  |          |
| Battleford -----      | 1,337         | 134      | 9                    | 1        | 0.67   | 0.75     |
| Swift Current -----   | 389           |          | 3                    | --       | 0.77   | --       |
| Manitoba:             |               |          |                      |          |  |          |
| Winnipeg-Brandon ---  | 293           | 2,050    | 3                    | 60       | 1.02   | 2.93     |
| Central Flyway:       |               |          |                      |          |  |          |
| Montana -----         | 174           | 281      | 0                    | 1        | --   | 0.36     |
| North Dakota -----    | 1,509         | --       | 4                    | --       | 0.26   | --       |
| South Dakota -----    | 608           | 2,851    | 3                    | 16       | 0.49   | 0.56     |
| Nebraska -----        | 285           | --       | 2                    | --       | 0.70   | --       |
| Mississippi Flyway:   |               |          |                      |          |  |          |
| Minnesota -----       | 789           | 1,744    | 7                    | 91       | 0.89   | 5.22     |
| Michigan -----        | --            | 118      | --                   | 2        | --   | 1.69     |
| Iowa -----            | 813           | 2,352    | 13                   | 127      | 1.60   | 5.40     |
| Missouri -----        | --            | 406      | --                   | 2        | --   | 0.49     |
| Illinois -----        | --            | 266      | --                   | 3        | --   | 1.13     |
| Ohio -----            | 124           | 317      | 1                    | 2        | 0.81   | 0.63     |

TABLE C-11.--Comparison of first hunting season recovery rates of blue-winged teal, 1961 to 1963

| Banding location                  | Adults |      |      | Immature |      |      |
|-----------------------------------|--------|------|------|----------|------|------|
|                                   | 1961   | 1962 | 1963 | 1961     | 1962 | 1963 |
| Canada:                           |        |      |      |          |      |      |
| Alberta:                          |        |      |      |          |      |      |
| Vermilion-Camrose -----           | 0.44   | 1.16 | 0.79 | --       | 0.44 | 1.24 |
| Saskatchewan:                     |        |      |      |          |      |      |
| Yorkton-Regina -----              | 0.97   | 0.51 | 0.85 | 1.32     | 1.68 | 2.55 |
| Prince Albert-N. Battleford ----- | 0.73   | 0.28 | 0.67 | --       | 3.45 | 0.75 |
| Manitoba:                         |        |      |      |          |      |      |
| Winnipeg-Brandon -----            | --     | 0.30 | 1.02 | --       | 3.38 | 2.93 |
| Central Flyway:                   |        |      |      |          |      |      |
| Montana -----                     | --     | --   | --   | --       | 1.16 | 0.36 |
| North Dakota -----                | --     | 1.00 | 0.26 | --       | --   | --   |
| Mississippi Flyway:               |        |      |      |          |      |      |
| Michigan -----                    | --     | --   | --   | 4.18     | 4.95 | 1.69 |
| Iowa -----                        | 0.29   | 1.18 | 1.60 | --       | 1.86 | 5.40 |

## D. WATERFOWL HARVEST TABLES

**TABLE D-1. --Percentage comparison between reported and observed hourly kill  
1961-62, 1962-63, and 1963-64 combined**

| Time of day      | Birds bagged |          | Percentage bagged |          |
|------------------|--------------|----------|-------------------|----------|
|                  | Reported     | Observed | Reported          | Observed |
| 5-6 a.m. -----   | 6            | 9        | 0.7               | 1.0      |
| 6-7 a.m. -----   | 50           | 59       | 5.6               | 6.6      |
| 7-8 a.m. -----   | 218          | 243      | 24.5              | 27.3     |
| 8-9 a.m. -----   | 221          | 169      | 24.9              | 19.0     |
| 9-10 a.m. -----  | 93           | 102      | 10.5              | 11.5     |
| 10-11 a.m. ----- | 49           | 43       | 5.5               | 4.8      |
| 11-12 a.m. ----- | 27           | 43       | 3.0               | 4.8      |
| 12-1 p.m. -----  | 38           | 34       | 4.3               | 3.8      |
| 1-2 p.m. -----   | 30           | 29       | 3.4               | 3.3      |
| 2-3 p.m. -----   | 58           | 44       | 6.5               | 4.9      |
| 3-4 p.m. -----   | 49           | 60       | 5.5               | 6.7      |
| 4-5 p.m. -----   | 38           | 44       | 4.3               | 4.9      |
| 5-6 p.m. -----   | 12           | 10       | 1.3               | 1.1      |
| Total-----       | 889          | 889      | 100.0             | 99.7     |

**TABLE D-2. --Difference between reported and observed times of kill combining  
1961-62, 1962-63, and 1963-64 data**

| Range in minutes | Relationship of reported to observed ducks-bagged |   |                  | Percent of total reports | Accumulated percent | Difference between observed and reported time in minutes |         |        |
|------------------|---|---|------------------|--------------------------|---------------------|--|---------|--------|
|                  |   |   |                  |                          |                     | Total  |         | Net    |
|                  | Later   | Earlier                                     | Total            |                          |                     | Later  | Earlier |        |
| 0-30 -----       | 214   | 248   | 597 <sup>1</sup> | 67.2                     | 67.2                | 2675   | 2824    | -149   |
| 0-15 -----       | 133   | 166   | 434 <sup>1</sup> | 48.8                     | --                  | 982  | 937     | +45    |
| 16-30 -----      | 81  | 82  | 163              | 18.3                     | --                  | 1693   | 1887    | -194   |
| 31-60 -----      | 83  | 68  | 151              | 17.0                     | 84.2                | 3770   | 3018    | +752   |
| 61-90 -----      | 46  | 22  | 68               | 7.6                      | 91.8                | 3407   | 1655    | +1752  |
| 91-120 -----     | 22  | 11  | 33               | 3.7                      | 95.5                | 2297   | 1155    | +1142  |
| 121-150 -----    | 11  | 6   | 17               | 1.9                      | 97.4                | 1483   | 836     | +647   |
| 151-180 -----    | 3   | 7   | 10               | 1.1                      | 98.5                | 527  | 1166    | -639   |
| 181-210 -----    | 4   | 3   | 7                | 0.8                      | 99.3                | 778  | 559     | +219   |
| 211-240 -----    | 2   | 1   | 3                | 0.3                      | 99.6                | 453  | 240     | +213   |
| 241-270 -----    | --  | 1   | 1                | 0.1                      | 99.7                | --   | 266     | -266.0 |
| 271-300 -----    | --  | --  | --               | --                       | --                  | --   | --      | --     |
| 301-330 -----    | --  | --  | --               | --                       | --                  | --   | --      | --     |
| 331-360 -----    | 2   | --  | 2                | 0.2                      | 99.9                | 693  | --      | +693   |
| Total -----      | 387   | 367   | 889              | 99.9                     | --                  | 16,083   | 11,719  | +4364  |
|                  | 1   | 135 reported at exact time observed killed. |                  |                          |                     |  |         | +4.9   |

TABLE D-3. —Proportion of their observed kill hunters reported by means of wing envelopes 1961-62, 1962-63, and 1963-64 combined

| Birds bagged per hunter | Observed number of |        | Birds bagged | Blinds reporting |         | Proportion of their kill reported by hunters |         |  |
|-------------------------|--------------------|--------|--------------|------------------|---------|--|---------|--|
|                         | Hunters/blind      | Blinds |              | Number           | Percent | Number                                       | Percent |  |
|                         |                    |        |              |                  |         |  |         |  |
| 0.1-1.0                 | 1                  | 31     | 31           | 22               | 70      | 19   | 61      |  |
|                         | 2                  | 106    | 155          | 65               | 61      | 84   | 54      |  |
|                         | 3                  | 32     | 72           | 17               | 53      | 32   | 44      |  |
|                         | 4                  | 7      | 20           | 5                | 71      | 13   | 65      |  |
|                         | 5                  | 4      | 19           | 2                | 50      | 13   | 68      |  |
|                         | 6                  | 4      | 10           | 3                | 75      | 7  | 70      |  |
| Subtotal-----           |                    | 184    | 307          | 114              | 62      | 168  | 55      |  |
| 1.1-2.0                 | 1                  | 33     | 64           | 23               | 70      | 38   | 59      |  |
|                         | 2                  | 77     | 268          | 58               | 75      | 154  | 58      |  |
|                         | 3                  | 19     | 97           | 14               | 74      | 60   | 62      |  |
|                         | 4                  | 10     | 67           | 7                | 70      | 42   | 63      |  |
|                         | 5                  | 5      | 40           | 4                | 80      | 23   | 58      |  |
|                         | 6                  | 3      | 26           | 3                | 100     | 10   | 39      |  |
| Subtotal-----           |                    | 147    | 562          | 109              | 74      | 327  | 58      |  |
| 2.1-6.0                 | 1                  | 36     | 137          | 28               | 78      | 87   | 64      |  |
|                         | 2                  | 53     | 375          | 40               | 75      | 234  | 62      |  |
|                         | 3                  | 12     | 103          | 11               | 92      | 66   | 64      |  |
|                         | 4                  | 6      | 65           | 6                | 100     | 30   | 46      |  |
|                         | 5                  | 1      | 14           | 1                | 100     | 11   | 79      |  |
|                         | 6                  | --     | --           | --               | --      | --   | --      |  |
| Subtotal-----           |                    | 108    | 694          | 86               | 80      | 428  | 62      |  |
| Total -----             |                    | 439    | 1563         | 309              | 70      | 923  | 59      |  |

TABLE D-4. —Summary of shots fired, ducks bagged and crippling, loss by regions, and Flyways 1961-62, 1962-63, and 1963-64, data combined

|            | Number of ducks |              |         |       |        | Number per 100 shots |         |      |        | Shots per bird |        | Cripples per bird bagged |
|------------|-----------------|--------------|---------|-------|--------|----------------------|---------|------|--------|----------------|--------|--------------------------|
|            | Shots fired     | Knocked down | Sailers | Hits  | Bagged | Knocked down         | Sailers | Hits | Bagged | Hits           | Bagged |                          |
|            | Regions:        |              |         |       |        |                      |         |      |        |                |        |                          |
| 1-----     | 2,050           | 438          | 192     | 630   | 416    | 21.4                 | 9.4     | 30.7 | 20.3   | 3.25           | 4.93   | 0.51                     |
| 2-----     | 1,668           | 286          | 77      | 363   | 240    | 17.1                 | 4.6     | 21.8 | 14.4   | 4.60           | 6.95   | 0.51                     |
| 3-----     | 2,344           | 394          | 121     | 515   | 344    | 16.8                 | 5.2     | 22.0 | 14.7   | 4.55           | 6.81   | 0.50                     |
| 4-----     | 2,388           | 502          | 151     | 653   | 455    | 21.0                 | 6.3     | 27.3 | 19.1   | 3.66           | 5.25   | 0.44                     |
| 5-----     | 1,822           | 364          | 69      | 433   | 315    | 20.0                 | 3.8     | 23.8 | 17.3   | 4.21           | 5.78   | 0.37                     |
| Flyways:   |                 |              |         |       |        |                      |         |      |        |                |        |                          |
| Pacific--  | 2,403           | 522          | 195     | 717   | 473    | 21.7                 | 8.1     | 29.8 | 19.7   | 3.35           | 5.08   | 0.52                     |
| Central--  | 1,764           | 286          | 99      | 385   | 253    | 16.2                 | 5.6     | 21.8 | 14.3   | 4.58           | 6.97   | 0.52                     |
| Miss. ---  | 3,129           | 553          | 174     | 728   | 490    | 17.7                 | 5.6     | 23.3 | 15.7   | 4.30           | 6.39   | 0.49                     |
| Atlantic-- | 2,976           | 623          | 142     | 765   | 554    | 20.9                 | 4.8     | 25.7 | 18.6   | 3.89           | 5.37   | 0.38                     |
| Total----  | 10,272          | 1,984        | 610     | 2,595 | 1,770  | 19.3                 | 5.9     | 25.3 | 17.2   | 3.96           | 5.80   | 0.47                     |

NOTE: Because of the limited nature and design of the sample, this material should not necessarily be considered as representative of either Regions or Flyways.

TABLE D-5.--Percentage of cripples that hunters reported, grouped by frequency class of cripples per blind-day, 1962-63 and 1963-64 data

| Cripples per<br>blind-day | Number of<br>blind-days |          | Number of<br>cripples |          | Percentage of<br>cripples<br>reported |
|---------------------------|-------------------------|----------|-----------------------|----------|---------------------------------------|
|                           | Reported                | Observed | Reported              | Observed |                                       |
| 0 -----                   | 99                      | 53       | --                    | --       | --                                    |
| 1 -----                   | 86                      | 73       | 86                    | 73       | 118                                   |
| 2 -----                   | 40                      | 49       | 80                    | 98       | 82                                    |
| 3 -----                   | 13                      | 34       | 39                    | 102      | 38                                    |
| 4 -----                   | 10                      | 18       | 40                    | 72       | 56                                    |
| 5 -----                   | 3                       | 9        | 15                    | 45       | 33                                    |
| 6 -----                   | 1                       | 11       | 6                     | 66       | 9                                     |
| 7 -----                   | --                      | 3        | --                    | 21       | 0                                     |
| 8 -----                   | 2                       | 3        | 16                    | 24       | 67                                    |
| 9 -----                   | --                      | --       | --                    | --       | --                                    |
| 10 -----                  | --                      | 1        | --                    | 10       | --                                    |
| Total -----               | 254                     | 254      | 282                   | 511      | 55                                    |

TABLE D-6.--Ratios of shots fired to birds bagged and cripples lost, to birds bagged in relation to sunrise and sunset, 1961-62, 1962-63, and 1963-64 data combined

| Flyways      | Before sunrise             | Hours after sunrise |      |      |      |      | Mid period <sup>1</sup> | Hours before sunset |       |      |       | After sunset | Entire day | Total shots |        |
|--------------|----------------------------|---------------------|------|------|------|------|-------------------------|---------------------|-------|------|-------|--------------|------------|-------------|--------|
|              |                            | 0-1                 | 1-2  | 2-3  | 3-4  | 4-5  |                         | 4-3                 | 3-2   | 2-1  | 1-0   |              |            |             |        |
| Pacific:     | birds bagged -----         | 70                  | 108  | 60   | 39   | 22   | 12                      | 23                  | 24    | 36   | 40    | 39           | --         | 473         | 2,403  |
|              | shots/birds bagged-----    | 3.27                | 5.02 | 5.27 | 5.08 | 5.55 | 10.25                   | 7.87                | 6.75  | 5.56 | 4.40  | 3.69         | --         | 5.08        |        |
|              | cripples/birds bagged----- | 0.46                | 0.56 | 0.48 | 0.77 | 0.45 | 0.67                    | 0.65                | 0.54  | 0.31 | 0.20  | 0.59         | --         | 0.52        |        |
| Central:     | birds bagged -----         | 15                  | 112  | 50   | 22   | 18   | 2                       | 2                   | 1     | 8    | 7     | 16           | --         | 253         | 1,764  |
|              | shots/birds bagged-----    | 5.07                | 5.76 | 7.80 | 8.64 | 7.44 | 17.50                   | 12.00               | 14.00 | 4.75 | 11.86 | 8.19         | --         | 6.97        |        |
|              | cripples/birds bagged----- | 0.33                | 0.46 | 0.42 | 0.68 | 0.28 | 1.00                    | 3.00                | 3.00  | 0.63 | 1.57  | 0.44         | --         | 0.52        |        |
| Mississippi: | birds bagged -----         | 12                  | 144  | 98   | 67   | 35   | 22                      | 37                  | 10    | 25   | 16    | 24           | --         | 490         | 3,129  |
|              | shots/birds bagged-----    | 1.92                | 5.97 | 6.17 | 6.70 | 6.77 | 7.41                    | 6.70                | 8.70  | 6.40 | 7.50  | 7.13         | --         | 6.39        |        |
|              | cripples/birds bagged----- | 0.17                | 0.50 | 0.49 | 0.55 | 0.40 | 0.32                    | 0.43                | 0.70  | 0.52 | 0.44  | 0.63         | --         | 0.49        |        |
| Atlantic:    | birds bagged -----         | 2                   | 150  | 93   | 36   | 28   | 22                      | 44                  | 26    | 32   | 59    | 47           | 15         | 554         | 2,976  |
|              | shots/birds bagged-----    | 7.50                | 4.72 | 4.84 | 6.31 | 5.11 | 4.68                    | 6.70                | 8.92  | 5.41 | 5.08  | 5.55         | 4.60       | 5.37        |        |
|              | cripples/birds bagged----- | --                  | 0.31 | 0.35 | 0.25 | 0.29 | 0.45                    | 0.73                | 0.81  | 0.28 | 0.27  | 0.49         | 0.20       | 0.38        |        |
| All flyways: | birds bagged -----         | 99                  | 514  | 301  | 164  | 103  | 58                      | 106                 | 61    | 101  | 122   | 126          | 15         | 1,770       | 10,272 |
|              | shots/birds bagged-----    | 3.46                | 5.36 | 5.85 | 6.49 | 6.17 | 7.31                    | 7.06                | 8.11  | 5.65 | 5.57  | 5.61         | 6.00       | 5.80        |        |
|              | cripples/birds bagged----- | 0.39                | 0.45 | 0.44 | 0.55 | 0.36 | 0.47                    | 0.65                | 0.72  | 0.38 | 0.34  | 0.54         | 0.53       | 0.47        |        |

NOTE: Because of the limited nature and design of the sample, this material should not necessarily be considered as representative of Flyways.

<sup>1</sup>Because time of day was computed as the number of hours after sunrise or before sunset and the data were taken from days of unequal length, a mid period of variable length remained.

TABLE D-7.--Total potential and active hunters during 1962-63 and  
1963-64 waterfowl hunting seasons

| State                | 1962-63              |                   | 1963-64              |                   |
|----------------------|----------------------|-------------------|----------------------|-------------------|
|                      | Potential<br>hunters | Active<br>hunters | Potential<br>hunters | Active<br>hunters |
| Pacific Flyway:      |                      |                   |                      |                   |
| Arizona -----        | 6,546                | 4,807             | 7,887                | 5,199             |
| California-----      | 135,581              | 106,854           | 147,334              | 120,609           |
| Idaho -----          | 24,337               | 19,443            | 25,625               | 20,743            |
| Nevada -----         | 8,678                | 5,970             | 9,486                | 7,483             |
| Oregon -----         | 42,467               | 33,077            | 47,421               | 36,150            |
| Utah -----           | 23,787               | 20,607            | 27,075               | 24,351            |
| Washington -----     | 67,361               | 48,783            | 71,503               | 53,480            |
| Flyway total -----   | 308,757              | 239,541           | 336,331              | 268,015           |
| Central Flyway:      |                      |                   |                      |                   |
| Colorado -----       | 17,201               | 13,010            | 25,106               | 19,140            |
| Kansas -----         | 24,330               | 16,123            | 31,387               | 22,436            |
| Montana -----        | 16,145               | 11,118            | 21,984               | 15,780            |
| Nebraska -----       | 21,118               | 14,193            | 28,818               | 22,727            |
| New Mexico -----     | 2,164                | 1,674             | 5,992                | 5,149             |
| North Dakota -----   | 28,307               | 22,853            | 39,824               | 32,243            |
| Oklahoma -----       | 16,418               | 11,105            | 21,928               | 16,230            |
| South Dakota -----   | 31,145               | 24,198            | 39,697               | 31,171            |
| Texas -----          | 57,062               | 43,682            | 80,666               | 59,090            |
| Wyoming -----        | 4,058                | 3,040             | 5,344                | 3,781             |
| Flyway total -----   | 217,948              | 160,996           | 300,746              | 227,747           |
| Mississippi Flyway:  |                      |                   |                      |                   |
| Alabama -----        | 6,861                | 5,490             | 12,274               | 9,882             |
| Arkansas -----       | 10,356               | 8,622             | 19,742               | 15,580            |
| Illinois -----       | 45,882               | 37,226            | 56,314               | 43,324            |
| Indiana -----        | 17,396               | 12,861            | 18,105               | 13,029            |
| Iowa -----           | 33,152               | 26,075            | 39,750               | 32,088            |
| Kentucky -----       | 4,903                | 4,025             | 6,163                | 4,960             |
| Louisiana -----      | 43,396               | 31,057            | 71,971               | 57,382            |
| Michigan -----       | 54,061               | 41,958            | 75,232               | 58,185            |
| Minnesota -----      | 85,076               | 72,135            | 120,150              | 106,065           |
| Mississippi -----    | 7,744                | 6,413             | 14,380               | 11,394            |
| Missouri -----       | 29,445               | 23,087            | 36,752               | 29,485            |
| Ohio -----           | 21,855               | 17,904            | 25,342               | 20,731            |
| Tennessee -----      | 8,723                | 7,270             | 16,430               | 13,388            |
| Wisconsin -----      | 79,694               | 63,516            | 101,222              | 82,119            |
| Flyway total -----   | 448,544              | 357,639           | 613,827              | 497,612           |
| Atlantic Flyway:     |                      |                   |                      |                   |
| Connecticut -----    | 7,597                | 5,678             | 8,097                | 5,676             |
| Delaware -----       | 5,992                | 4,750             | 7,740                | 5,970             |
| Florida -----        | 21,984               | 15,911            | 27,591               | 20,392            |
| Georgia -----        | 6,280                | 4,655             | 11,302               | 8,582             |
| Maine -----          | 8,505                | 6,806             | 10,501               | 8,071             |
| Maryland -----       | 20,158               | 15,743            | 23,976               | 18,461            |
| Massachusetts -----  | 18,288               | 12,938            | 22,850               | 15,631            |
| New Hampshire -----  | 4,610                | 3,400             | 3,811                | 2,726             |
| New Jersey -----     | 19,979               | 15,872            | 23,337               | 18,124            |
| New York -----       | 53,214               | 36,328            | 46,606               | 28,370            |
| North Carolina ----- | 21,775               | 17,378            | 25,258               | 19,042            |
| Pennsylvania -----   | 29,428               | 24,547            | 35,794               | 28,403            |

TABLE D-7.--Total potential and active hunters during 1962-63 and  
1963-64 waterfowl hunting seasons (continued)

| State                            | 1962-63              |                   | 1963-64              |                   |
|----------------------------------|----------------------|-------------------|----------------------|-------------------|
|                                  | Potential<br>hunters | Active<br>hunters | Potential<br>hunters | Active<br>hunters |
| <b>Atlantic Flyway: (cont'd)</b> |                      |                   |                      |                   |
| Rhode Island -----               | 1,730                | 1,453             | 2,468                | 1,920             |
| South Carolina -----             | 11,151               | 9,334             | 14,132               | 11,557            |
| Vermont -----                    | 3,883                | 3,107             | 3,714                | 2,728             |
| Virginia -----                   | 14,960               | 10,832            | 19,005               | 14,458            |
| West Virginia -----              | 1,528                | 1,208             | 1,517                | 989               |
| Flyway total -----               | 251,422              | 189,940           | 287,699              | 211,100           |

TABLE D-8. -- Total bags of ducks, by species, and coots and total non-retrieved ducks and coots in Pacific Flyway during 1962 and 1963 hunting seasons

[ Bag estimates adjusted for response bias]

| Species 1                         | 1962      | 1963                 | Percent change |
|-----------------------------------|-----------|----------------------|----------------|
| <b>Ducks:</b>                     |           |                      |                |
| Dabblers:                         |           |                      |                |
| Mallard                           | 572,300   | 843,900              | +47            |
| Domestic mallard                  | 1,200     | 300                  | -75            |
| Gadwall                           | 43,600    | 99,900               | +129           |
| American widgeon                  | 256,000   | 324,400 <sup>1</sup> | +27            |
| Green-winged teal                 | 250,800   | 376,300              | +50            |
| Blue-winged and cinnamon teal     | 59,200    | 95,000               | +60            |
| Shoveler                          | 123,200   | 256,900              | +109           |
| Pintail                           | 418,900   | 585,800              | +40            |
| Wood duck                         | 11,300    | 16,100               | +42            |
| Divers:                           |           |                      |                |
| Redhead                           | 4,000     | 8,300                | +108           |
| Canvasback                        | 500       | 500                  | 0              |
| Greater scaup                     | 36,700    | 10,700               | -71            |
| Lesser scaup                      | 21,200    | 28,200               | +33            |
| Ring-necked duck                  | 8,700     | 15,500               | +78            |
| Goldeneye                         | 14,800    | 16,900               | +14            |
| Bufflehead                        | 24,800    | 27,300               | +10            |
| Ruddy duck                        | 23,800    | 35,200               | +48            |
| Miscellaneous:                    |           |                      |                |
| Common and red-breasted merganser | 2,800     | 1,200                | -57            |
| Hooded merganser                  | 1,500     | 1,000                | -33            |
| Oldsquaw                          | 1,300     | 0                    | -              |
| Scoter                            | 7,300     | 800                  | -89            |
| Others and unknown                | 1,400     | 0                    | -              |
| <b>Total:</b>                     |           |                      |                |
| Retrieved                         | 1,884,600 | 2,741,500            | +45            |
| Not retrieved                     | 404,700   | 545,500              | +35            |
| Ducks killed                      | 2,289,300 | 3,286,900            | +44            |
| <b>Coots:</b>                     |           |                      |                |
| Retrieved                         | 67,300    | 72,000               | +7             |
| Not retrieved                     | 30,000    | 52,300               | +74            |
| Coots killed                      | 97,300    | 124,300              | +28            |

<sup>1</sup>Species composition derived from the 1962 and 1963 duck wing surveys.

**TABLE D-9. --Total bags, by species, and crippling losses of geese in the Pacific Flyway during the 1962 and 1963 hunting seasons**

[ Bag estimates adjusted for response bias]

| Species             | 1962    | 1963    | Percent change |
|---------------------|---------|---------|----------------|
| Geese:              |         |         |                |
| Canada goose        | 116,300 | 182,500 | +57            |
| Snow goose          | 34,800  | 66,700  | +92            |
| Blue goose          | 200     | 0       | --             |
| White-fronted goose | 52,400  | 68,600  | +31            |
| Black brant         | 10,000  | 11,100  | +11            |
| Total:              |         |         |                |
| Retrieved           | 213,700 | 328,900 | +54            |
| Not retrieved       | 37,500  | 64,500  | +72            |
| Geese killed        | 251,200 | 393,400 | +57            |

TABLE D-10.--Waterfowl hunting activity and bags of ducks and geese in the PACIFIC FLYWAY  
during the 1963 hunting season, with 1962 season comparisons

[ Estimates unadjusted for response bias. Colorado, Montana, New Mexico, and Wyoming listed in  
Central Flyway, table D-13]

| Hunting season   | Duck bag limit | Days in duck season | Days per active hunters | Hunter-days           |             | Duck bag                      |             | Goose bag                     |             |
|------------------|----------------|---------------------|-------------------------|-----------------------|-------------|-------------------------------|-------------|-------------------------------|-------------|
|                  |                |                     |                         | Days per adult hunter | State total | Seasonal bag per adult hunter | State total | Seasonal bag per adult hunter | State total |
| Arizona:         |                |                     |                         |                       |             |                               |             |                               |             |
| 1962 -----       | 5-5            | 68 <sup>1</sup>     | 4,810                   | 5.15                  | 24,800      | 4.67                          | 21,700      | 0.41                          | 1,900       |
| 1963 -----       | 5-5            | 90                  | 5,200                   | 6.47                  | 33,700      | 7.10                          | 35,800      | 0.32                          | 1,600       |
| Percent change - |                |                     | +8                      | +26                   | +36         | +52                           | +65         | -22                           | -16         |
| California:      |                |                     |                         |                       |             |                               |             |                               |             |
| 1962 -----       | 5-5            | 68 <sup>1</sup>     | 106,850                 | 7.34                  | 786,700     | 11.90                         | 1,231,700   | 1.65                          | 169,600     |
| 1963 -----       | 6-6            | 75                  | 120,610                 | 7.39                  | 894,200     | 16.08                         | 1,879,100   | 2.30                          | 267,800     |
| Percent change - |                |                     | +13                     | +1                    | +14         | +35                           | +53         | +39                           | +58         |
| Idaho:           |                |                     |                         |                       |             |                               |             |                               |             |
| 1962 -----       | 5-5            | 75                  | 19,440                  | 6.78                  | 132,300     | 10.29                         | 193,900     | 0.55                          | 10,200      |
| 1963 -----       | 5-5            | 93                  | 20,740                  | 7.98                  | 166,100     | 15.27                         | 306,900     | 1.08                          | 21,500      |
| Percent change - |                |                     | +7                      | +18                   | +26         | +48                           | +58         | +96                           | +111        |
| Nevada:          |                |                     |                         |                       |             |                               |             |                               |             |
| 1962 -----       | 4-8            | 65                  | 5,970                   | 6.12                  | 36,700      | 6.77                          | 39,200      | 0.67                          | 3,900       |
| 1963 -----       | 4-8            | 87                  | 7,480                   | 7.02                  | 52,700      | 10.57                         | 76,600      | 0.84                          | 6,100       |
| Percent change - |                |                     | +25                     | +15                   | +44         | +56                           | +95         | +25                           | +56         |
| Oregon:          |                |                     |                         |                       |             |                               |             |                               |             |
| 1962 -----       | 4-8            | 75                  | 33,080                  | 7.58                  | 251,400     | 8.80                          | 282,000     | 0.92                          | 29,500      |
| 1963 -----       | 4-8            | 90                  | 36,150                  | 7.01                  | 254,200     | 8.70                          | 304,700     | 1.42                          | 49,600      |
| Percent change - |                |                     | +9                      | -8                    | -1          | -1                            | +8          | +54                           | +68         |
| Utah:            |                |                     |                         |                       |             |                               |             |                               |             |
| 1962 -----       | 5-5            | 75                  | 20,610                  | 5.10                  | 105,500     | 7.25                          | 144,700     | 0.34                          | 6,800       |
| 1963 -----       | 5-5            | 90                  | 24,350                  | 6.71                  | 163,900     | 12.88                         | 303,900     | 0.43                          | 10,200      |
| Percent change - |                |                     | +18                     | +32                   | +55         | +78                           | +110        | +27                           | +50         |

<sup>1</sup>Split season.

TABLE D-10. --Waterfowl hunting activity and bags of ducks and geese in the PACIFIC FLYWAY  
during the 1963 hunting season, with 1962 season comparisons (continued)

[ Estimates unadjusted for response bias. Colorado, Montana, New Mexico, and Wyoming listed in  
Central Flyway, table D-13]

| Hunting<br>season | Duck<br>bag<br>limit                         | Days<br>in<br>duck<br>season | Days<br>per<br>active<br>hunters | Hunter-days                    |                | Duck bag                               |                | Goose bag                              |                |
|-------------------|--|------------------------------|----------------------------------|--------------------------------|----------------|--|----------------|--|----------------|
|                   |  |                              |                                  | Days<br>per<br>adult<br>hunter | State<br>total | Seasonal<br>bag per<br>adult<br>hunter | State<br>total | Seasonal<br>bag per<br>adult<br>hunter | State<br>total |
| Washington:       | 1962 -----<br>1963 -----<br>Percent change - | 4-8<br>4-8                   | 75<br>86                         | 48,780<br>53,480<br>+10        | 7.96           | 389,300                                | 10.02          | 473,800                                | 0.62           |
|                   |  |                              |                                  |                                | 7.97           | 427,600                                | 10.91          | 565,300                                | 0.57           |
|                   |  |                              |                                  |                                | 0              | +10                                    | +9             | +19                                    | -8             |
|                   | Flyway total:                                | ---                          | --                               | 239,540                        | 7.19           | 1,726,700                              | 10.28          | 2,387,000                              | 1.09           |
|                   | 1962 -----<br>1963 -----<br>Percent change - | ---                          | --                               | 268,020<br>+12                 | 7.41<br>+3     | 1,992,500<br>+15                       | 13.32<br>+30   | 3,472,300<br>+46                       | 1.48<br>+36    |
|                   |  | ---                          | --                               |                                |                |  |                |  | +54            |

**TABLE D-11.--Total bags of ducks, by species, and coots and total non-retrieved ducks and coots in the CENTRAL FLYWAY during the 1962 and the 1963 hunting seasons**

[ Bag estimates adjusted for response bias]

| Species <sup>1</sup>              | 1962    | 1963      | Percent change |
|-----------------------------------|---------|-----------|----------------|
| <b>Ducks:</b>                     |         |           |                |
| <b>Dabblers:</b>                  |         |           |                |
| Mallard                           | 220,700 | 457,400   | +107           |
| Domestic mallard                  | 200     | 100       | -50            |
| Black duck                        | 600     | 900       | +50            |
| Black X Mallard                   | 0       | 400       | -              |
| Mottled duck                      | 10,600  | 18,400    | +74            |
| Gadwall                           | 39,400  | 116,300   | +195           |
| American widgeon                  | 30,300  | 80,900    | +167           |
| Green-winged teal                 | 49,000  | 125,200   | +156           |
| Blue-winged and cinnamon teal     | 9,500   | 43,800    | +361           |
| Shoveler                          | 17,300  | 43,900    | +154           |
| Pintail                           | 50,400  | 102,900   | +104           |
| Wood duck                         | 9,400   | 18,500    | +97            |
| <b>Divers:</b>                    |         |           |                |
| Redhead                           | 1,200   | 4,000     | +233           |
| Canvasback                        | 0       | 300       | -              |
| Greater scaup                     | 700     | 800       | +14            |
| Lesser scaup                      | 12,200  | 37,600    | +208           |
| Ring-necked duck                  | 11,500  | 15,000    | +30            |
| Goldeneye                         | 1,000   | 3,400     | +240           |
| Bufflehead                        | 2,200   | 4,200     | +91            |
| Ruddy duck                        | 1,400   | 2,100     | +50            |
| <b>Miscellaneous:</b>             |         |           |                |
| Common and red-breasted merganser | 300     | 500       | +67            |
| Hooded merganser                  | 500     | 1,700     | +240           |
| Scoter                            | 0       | 0         | 0              |
| Others and unknown                | 200     | 100       | -50            |
| <b>Total:</b>                     |         |           |                |
| Retrieved                         | 468,300 | 1,078,600 | +130           |
| Not retrieved                     | 129,400 | 264,800   | +105           |
| Ducks killed                      | 597,700 | 1,343,500 | +125           |
| <b>Coots:</b>                     |         |           |                |
| Retrieved                         | 10,100  | 22,700    | +125           |
| Not retrieved                     | 7,900   | 10,300    | +30            |
| Coots killed                      | 18,000  | 33,000    | +83            |

<sup>1</sup>Species composition derived from the 1962 and 1963 duck wing surveys.

TABLE D-12.--Total bags, by species, and crippling losses of geese in the CENTRAL FLYWAY during the 1962 and 1963 hunting seasons

[ Bag estimates adjusted for response bias]

| Species                   | 1962    | 1963    | Percent change |
|---------------------------|---------|---------|----------------|
| Geese:                    |         |         |                |
| Canada goose <sup>1</sup> | 82,800  | 114,000 | +38            |
| Snow goose                | 61,600  | 87,000  | +41            |
| Blue goose                | 25,400  | 33,600  | +32            |
| White-fronted goose       | 23,100  | 29,900  | +29            |
| Brant                     | 0       | 200     | --             |
| Total:                    |         |         |                |
| Retrieved                 | 192,900 | 264,800 | +37            |
| Not retrieved             | 30,400  | 46,700  | +54            |
| Geese killed              | 223,300 | 311,500 | +39            |

<sup>1</sup>Includes Hutchins' goose.

TABLE D-13. --Waterfowl hunting activity and bags of ducks and geese in CENTRAL FLYWAY during 1963 hunting season, with 1962 season comparisons

[ Estimates unadjusted for response bias]

| Hunting season   | Duck bag limit | Days in duck season | Total active hunters | Hunter-days           |             | Seasonal bag per adult hunter | Duck bag    |                               | Goose bag   |             |
|------------------|----------------|---------------------|----------------------|-----------------------|-------------|-------------------------------|-------------|-------------------------------|-------------|-------------|
|                  |                |                     |                      | Days per adult hunter | State total |                               | State total | Seasonal bag per adult hunter | State total | State total |
| Colorado         |                |                     |                      |                       |             |                               |             |                               |             |             |
| 1962 -----       | 2-4            | 25                  | 13,010               | 5.76                  | 74,200      | 2.76                          | 34,700      | 0.58                          | 7,200       |             |
|                  | 4-8            | 75 <sup>1</sup>     |                      |                       |             |                               |             |                               |             |             |
| 1963 -----       | 4-8            | 35                  | 19,140               | 5.93                  | 112,400     | 5.41                          | 100,200     | 0.63                          | 11,400      |             |
| Percent change - | 4-8            | 90 <sup>1</sup>     |                      | +47                   | +3          | +52                           | +96         | +189                          | +9          | +58         |
| Kansas           |                |                     |                      |                       |             |                               |             |                               |             |             |
| 1962 -----       | 2-4            | 25                  | 16,120               | 6.17                  | 98,400      | 2.71                          | 42,200      | 0.45                          | 6,800       |             |
|                  | 4-8            | 35                  | 22,440               | 6.80                  | 151,000     | 5.41                          | 117,400     | 0.46                          | 9,900       |             |
| Percent change - |                |                     | +39                  | +10                   | +54         | +100                          | +178        | +2                            | +46         |             |
| Montana          |                |                     |                      |                       |             |                               |             |                               |             |             |
| 1962 -----       | 2-4            | 25                  | 11,120               | 6.07                  | 66,800      | 3.89                          | 41,900      | 0.83                          | 8,800       |             |
|                  | 5-5            | 75 <sup>1</sup>     |                      |                       |             |                               |             |                               |             |             |
| 1963 -----       | 4-8            | 35                  | 15,780               | 6.04                  | 94,400      | 6.87                          | 104,900     | 0.50                          | 7,500       |             |
| Percent change - | 5-10           | 75 <sup>1</sup>     |                      | +42                   | -1          | +41                           | +77         | +150                          | -40         | -15         |
| Nebraska         |                |                     |                      |                       |             |                               |             |                               |             |             |
| 1962 -----       | 2-4            | 25 <sup>2</sup>     | 14,190               | 7.91                  | 111,200     | 3.25                          | 44,600      | 0.91                          | 12,200      |             |
|                  | 4-8            | 32 <sup>2</sup>     | 22,730               | 6.47                  | 145,600     | 6.53                          | 143,500     | 0.71                          | 15,300      |             |
| Percent change   |                |                     | +60                  | -18                   | +31         | +101                          | +222        | -22                           | +25         |             |
| New Mexico       |                |                     |                      |                       |             |                               |             |                               |             |             |
| 1962 -----       | 2-4            | 25 <sup>1</sup>     | 1,670                | 4.94                  | 8,200       | 3.45                          | 5,600       | 0.34                          | 500         |             |
|                  | 4-8            | 75 <sup>1</sup>     |                      |                       |             |                               |             |                               |             |             |
| 1963 -----       | 4-8            | 35                  | 5,150                | 6.40                  | 32,600      | 7.49                          | 37,300      | 0.58                          | 2,800       |             |
| Percent change - | 4-8            | 86 <sup>1</sup>     |                      | +208                  | +30         | +298                          | +117        | +566                          | +71         | +460        |
| North Dakota     |                |                     |                      |                       |             |                               |             |                               |             |             |
| 1962 -----       | 2-4            | 25                  | 22,850               | 6.37                  | 144,200     | 5.55                          | 122,700     | 0.96                          | 20,800      |             |
|                  | 4-8            | 35                  | 32,240               | 7.45                  | 237,800     | 7.27                          | 226,700     | 1.74                          | 53,400      |             |
| Percent change - |                |                     | +41                  | +17                   | +65         | +31                           | +85         | +81                           | +157        |             |

TABLE D-13. --Waterfowl hunting activity and bags of ducks and geese in CENTRAL FLYWAY during 1963 hunting season, with 1962 season comparisons (continued)

[ Estimates unadjusted for response bias]

| Hunting season   | Duck bag limit | Days in duck season | Total active hunters | Hunter-days           |             | Duck bag                      |             | Goose bag                     |             |
|------------------|----------------|---------------------|----------------------|-----------------------|-------------|-------------------------------|-------------|-------------------------------|-------------|
|                  |                |                     |                      | Days per adult hunter | State total | Seasonal bag per adult hunter | State total | Seasonal bag per adult hunter | State total |
| Oklahoma         |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----       | 2-4            | 25                  | 11,110               | 6.06                  | 66,600      | 2.84                          | 30,500      | 0.75                          | 7,900       |
| 1963 -----       | 4-8            | 35                  | 16,230               | 5.74                  | 92,200      | 3.18                          | 49,900      | 0.97                          | 14,900      |
| Percent change - |                |                     | +46                  | -5                    | +38         | +12                           | +64         | +29                           | +89         |
| South Dakota     |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----       | 2-4            | 25                  | 24,200               | 6.82                  | 163,500     | 4.57                          | 106,900     | 2.05                          | 47,200      |
| 1963 -----       | 4-8            | 35                  | 31,170               | 7.71                  | 237,900     | 9.50                          | 286,400     | 1.62                          | 48,000      |
| Percent change - |                |                     | +29                  | +13                   | +46         | +108                          | +168        | -21                           | +2          |
| Texas            |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----       | 2-4            | 25                  | 43,680               | 6.49                  | 280,500     | 4.47                          | 188,700     | 2.64                          | 109,500     |
| 1963 -----       | 4-8            | 35                  | 59,090               | 5.92                  | 346,300     | 6.42                          | 366,900     | 2.49                          | 139,700     |
| Percent change - |                |                     | +35                  | -9                    | +24         | +44                           | +94         | -6                            | +28         |
| Wyoming          |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----       | 2-4            | 25                  | 3,040                | 5.87                  | 17,700      | 5.41                          | 15,900      | 0.47                          | 1,300       |
|                  | 4-8            | 75 <sup>1</sup>     |                      |                       |             |                               |             |                               |             |
| 1963 -----       | 4-8            | 35                  | 3,780                | 5.70                  | 21,300      | 7.20                          | 26,300      | 0.57                          | 2,000       |
| Percent change - | 4-8            | 88 <sup>1</sup>     | +24                  | -3                    | +20         | +33                           | +65         | +21                           | +54         |
| Flyway total:    |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----       | ---            | --                  | 161,000              | 6.47                  | 1,031,200   | 4.07                          | 633,600     | 1.45                          | 222,200     |
| 1963 -----       | ---            | --                  | 227,750              | 6.53                  | 1,471,600   | 6.63                          | 1,459,600   | 1.40                          | 304,900     |
| Percent change - | ---            | --                  | +42                  | +1                    | +43         | +63                           | +130        | -3                            | +37         |

<sup>1</sup> State's bag limit and season length west of Continental Divide (Pacific Flyway).

<sup>2</sup> Split season.

TABLE D-14. --Total bags of ducks, by species, and coots and total non-retrieved ducks and coots in the MISSISSIPPI FLYWAY during the 1962 and the 1963 hunting seasons

[ Bag estimates adjusted for response bias]

| Species <sup>1</sup>              | 1962      | 1963      | Percent change |
|-----------------------------------|-----------|-----------|----------------|
| <b>Ducks:</b>                     |           |           |                |
| <b>Dabblers:</b>                  |           |           |                |
| Mallard                           | 442,200   | 925,500   | +109           |
| Domestic Mallard                  | 1,700     | 4,400     | +159           |
| Black duck                        | 43,600    | 73,600    | +69            |
| Black X Mallard                   | 2,600     | 3,000     | +15            |
| Mottled and                       |           |           |                |
| Florida duck                      | 8,200     | 19,700    | +140           |
| Gadwall                           | 31,600    | 109,100   | +245           |
| American widgeon                  | 55,200    | 118,300   | +114           |
| Green-winged teal                 | 69,900    | 164,100   | +135           |
| Blue-winged teal                  | 51,300    | 197,800   | +286           |
| Shoveler                          | 15,500    | 43,400    | +180           |
| Pintail                           | 55,400    | 108,700   | +96            |
| Wood duck                         | 163,500   | 372,300   | +128           |
| <b>Divers:</b>                    |           |           |                |
| Redhead                           | 2,200     | 4,300     | +95            |
| Canvasback                        | 100       | 200       | +100           |
| Greater scaup                     | 11,600    | 11,800    | +2             |
| Lesser scaup                      | 49,600    | 189,100   | +281           |
| Ring-necked duck                  | 92,900    | 123,300   | +33            |
| Goldeneye                         | 6,700     | 7,600     | +13            |
| Bufflehead                        | 11,800    | 17,200    | +46            |
| Ruddy duck                        | 5,800     | 8,200     | +41            |
| <b>Miscellaneous:</b>             |           |           |                |
| Common and red-breasted merganser | 700       | 2,100     | +200           |
| Hooded merganser                  | 6,800     | 12,800    | +88            |
| Oldsquaw and eider                | 100       | 900       | +800           |
| Scoter                            | 400       | 1,800     | +350           |
| Others and unknown                | 600       | 500       | -17            |
| <b>Total:</b>                     |           |           |                |
| Retrieved                         | 1,130,800 | 2,519,800 | +123           |
| Not retrieved                     | 316,200   | 689,500   | +118           |
| <b>Ducks killed</b>               |           |           |                |
|                                   | 1,447,000 | 3,209,400 | +122           |
| <b>Coots:</b>                     |           |           |                |
| Retrieved                         | 80,600    | 225,900   | +180           |
| Not retrieved                     | 24,500    | 61,900    | +153           |
| <b>Coots killed</b>               |           |           |                |
|                                   | 105,100   | 287,800   | +174           |

<sup>1</sup>Species composition derived from the 1962 and 1963 duck wing surveys.

TABLE D-15.--Total bags, by species, and crippling losses of geese in the MISSISSIPPI FLYWAY during the 1962 and 1963 hunting seasons

[ Bag estimates adjusted for response bias]

| Species                   | 1962    | 1963    | Percent change |
|---------------------------|---------|---------|----------------|
| Geese:                    |         |         |                |
| Canada goose <sup>1</sup> | 80,700  | 106,400 | +32            |
| Snow goose                | 9,400   | 19,100  | +103           |
| Blue goose                | 31,900  | 47,400  | +49            |
| White-fronted goose       | 3,600   | 7,800   | +117           |
| Total:                    |         |         |                |
| Retrieved                 | 125,600 | 180,700 | +44            |
| Not retrieved             | 26,600  | 35,700  | +34            |
| Geese killed              | 152,200 | 216,400 | +42            |

<sup>1</sup>Includes Hutchins' goose.

TABLE D-16.--Waterfowl hunting activity and bags of ducks and geese in Mississippi Flyway  
during 1963 hunting season, with 1962 season comparisons

[ Estimates unadjusted for response bias]

| Hunting season   | Duck bag limit | Days in duck season | Total active hunters | Hunter-days           |             | Duck bag                      |             | Goose bag                     |             |
|------------------|----------------|---------------------|----------------------|-----------------------|-------------|-------------------------------|-------------|-------------------------------|-------------|
|                  |                |                     |                      | Days per adult hunter | State total | Seasonal bag per adult hunter | State total | Seasonal bag per adult hunter | State total |
| <b>Alabama:</b>  |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----       | 2-4            | 25                  | 5,490                | 6.60                  | 35,900      | 5.40                          | 28,800      | 0.58                          | 3,000       |
| 1963 -----       | 4-8            | 35                  | 9,880                | 7.08                  | 69,300      | 7.89                          | 75,600      | 0.30                          | 2,800       |
| Percent change - |                |                     | +80                  | +7                    | +93         | +46                           | +163        | -48                           | -7          |
| <b>Arkansas:</b> |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----       | 2-4            | 25                  | 8,620                | 7.29                  | 62,300      | 8.21                          | 68,600      | 0.08                          | 700         |
| 1963 -----       | 4-8            | 35                  | 15,580               | 6.94                  | 107,100     | 11.18                         | 168,800     | 0.10                          | 1,500       |
| Percent change - |                |                     | +81                  | -5                    | +72         | +36                           | +146        | +25                           | +114        |
| <b>Illinois:</b> |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----       | 2-4            | 25                  | 37,230               | 6.35                  | 234,200     | 2.96                          | 106,600     | 0.36                          | 12,700      |
| 1963 -----       | 4-8            | 35                  | 43,320               | 6.61                  | 283,700     | 5.58                          | 234,300     | 0.45                          | 18,700      |
| Percent change - |                |                     | +16                  | +4                    | +21         | +89                           | +120        | +25                           | +47         |
| <b>Indiana:</b>  |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----       | 2-4            | 25                  | 12,860               | 5.06                  | 64,500      | 1.38                          | 17,200      | 0.27                          | 3,300       |
| 1963 -----       | 4-8            | 32 <sup>1</sup>     | 13,030               | 5.01                  | 64,700      | 1.83                          | 23,100      | 0.13                          | 1,700       |
| Percent change - |                |                     | +1                   | -1                    | 0           | +33                           | +34         | -52                           | -49         |
| <b>Iowa:</b>     |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----       | 2-4            | 25                  | 26,080               | 6.71                  | 173,300     | 2.68                          | 67,700      | 0.73                          | 18,300      |
| 1963 -----       | 4-8            | 32 <sup>1</sup>     | 32,090               | 7.69                  | 244,500     | 6.02                          | 187,200     | 0.80                          | 24,400      |
| Percent change - |                |                     | +23                  | +15                   | +41         | +125                          | +177        | +10                           | +33         |
| <b>Kentucky:</b> |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----       | 2-4            | 25                  | 4,030                | 4.99                  | 19,900      | 1.98                          | 7,700       | 0.33                          | 1,300       |
| 1963 -----       | 4-8            | 35                  | 4,960                | 5.15                  | 25,300      | 3.43                          | 16,500      | 0.55                          | 2,600       |
| Percent change   |                |                     | +23                  | +3                    | +27         | +73                           | +114        | +67                           | +100        |
| <b>Louisiana</b> |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----       | 2-4            | 25                  | 31,060               | 6.18                  | 190,200     | 8.26                          | 248,700     | 0.86                          | 25,600      |
| 1963 -----       | 4-8            | 35                  | 57,380               | 7.37                  | 419,000     | 15.66                         | 870,800     | 0.72                          | 39,400      |
| Percent change - |                |                     | +85                  | +19                   | +120        | +90                           | +250        | -16                           | +54         |

TABLE D-16. --Waterfowl hunting activity bags of ducks and geese in Mississippi Flyway  
during 1963 hunting season, with 1962 season comparisons (continued)

[ Estimates unadjusted for response bias]

| Hunting season     | Duck bag limit | Days in duck season | Total active hunters | Hunter-days           |             | Duck bag                      |             | Goose bag                     |             |
|--------------------|----------------|---------------------|----------------------|-----------------------|-------------|-------------------------------|-------------|-------------------------------|-------------|
|                    |                |                     |                      | Days per adult hunter | State total | Seasonal bag per adult hunter | State total | Seasonal bag per adult hunter | State total |
| <b>Michigan</b>    |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----         | 2-4            | 25                  | 41,960               | 5.12                  | 212,700     | 3.19                          | 129,800     | 0.28                          | 11,200      |
| 1963 -----         | 4-8            | 35                  | 58,190               | 5.64                  | 325,100     | 3.03                          | 170,800     | 0.29                          | 16,200      |
| Percent change     |                |                     | +39                  | +10                   | +53         | -5                            | +32         | +4                            | +45         |
| <b>Minnesota</b>   |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----         | 2-4            | 25                  | 72,140               | 5.73                  | 409,400     | 5.39                          | 376,400     | 0.20                          | 13,600      |
| 1963 -----         | 3-6            | 35                  | 106,070              | 5.97                  | 627,400     | 7.21                          | 741,000     | 0.22                          | 22,700      |
| Percent change     |                |                     | +47                  | +4                    | +53         | +34                           | +97         | +10                           | +67         |
| <b>Mississippi</b> |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----         | 2-4            | 25                  | 6,410                | 5.95                  | 37,800      | 6.84                          | 42,500      | 0.07                          | 400         |
| 1963 -----         | 4-8            | 35                  | 11,390               | 6.45                  | 72,800      | 10.14                         | 112,000     | 0.08                          | 900         |
| Percent change     |                |                     | +78                  | +8                    | +93         | +48                           | +164        | +14                           | +125        |
| <b>Missouri</b>    |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----         | 2-4            | 25                  | 23,090               | 5.25                  | 120,200     | 1.62                          | 36,200      | 1.35                          | 29,800      |
| 1963 -----         | 4-8            | 35                  | 29,490               | 5.67                  | 165,600     | 2.96                          | 84,600      | 1.81                          | 51,000      |
| Percent change     |                |                     | +28                  | +8                    | +38         | +83                           | +134        | +34                           | +71         |
| <b>Ohio</b>        |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----         | 2-4            | 25                  | 17,900               | 5.89                  | 104,500     | 2.99                          | 51,900      | 0.14                          | 2,500       |
| 1963 -----         | 4-8            | 32 <sup>1</sup>     | 20,730               | 6.62                  | 136,000     | 4.37                          | 87,800      | 0.12                          | 2,400       |
| Percent change     |                |                     | +16                  | +12                   | +30         | +46                           | +69         | -14                           | -4          |
| <b>Tennessee</b>   |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----         | 2-4            | 25                  | 7,270                | 5.40                  | 38,900      | 2.33                          | 16,400      | 0.31                          | 2,100       |
| 1963 -----         | 4-8            | 35                  | 13,390               | 6.05                  | 80,300      | 7.41                          | 96,100      | 0.19                          | 2,400       |
| Percent change     |                |                     | +84                  | +12                   | +106        | +218                          | +486        | -39                           | +14         |

TABLE D-16.--Waterfowl hunting activity bags of ducks and geese in Mississippi Flyway during 1963 hunting season, with 1962 season comparisons (continued)

[ Estimates unadjusted for response bias]

| Hunting season       | Duck bag limit | Days in duck season | Total active hunters | Hunter-days           |             | Seasonal bag per adult hunter | State total | Duck bag                      |             | Goose bag                     |             |
|----------------------|----------------|---------------------|----------------------|-----------------------|-------------|-------------------------------|-------------|-------------------------------|-------------|-------------------------------|-------------|
|                      |                |                     |                      | Days per adult hunter | State total |                               |             | Seasonal bag per adult hunter | State total | Seasonal bag per adult hunter | State total |
| <b>Wisconsin</b>     |                |                     |                      |                       |             |                               |             |                               |             |                               |             |
| 1962 -----           | 2-4            | 25                  | 63,520               | 7.20                  | 452,900     | 4.19                          | 257,800     | 0.39                          | 23,400      |                               |             |
| 1963 -----           | 4-8            | 35                  | 82,120               | 6.40                  | 520,700     | 4.73                          | 376,400     | 0.33                          | 26,200      |                               |             |
| Percent change -     |                |                     | +29                  | -11                   | +15         | +13                           | +46         | -15                           | +12         |                               |             |
| <b>Flyway total:</b> |                |                     |                      |                       |             |                               |             |                               |             |                               |             |
| 1962 -----           | ---            | --                  | 357,640              | 6.09                  | 2,156,800   | 4.20                          | 1,456,200   | 0.43                          | 148,100     |                               |             |
| 1963 -----           | ---            | --                  | 497,610              | 6.37                  | 3,141,500   | 6.72                          | 3,244,900   | 0.45                          | 213,100     |                               |             |
| Percent change -     | ---            | --                  | +39                  | +5                    | +46         | +60                           | +123        | +5                            | +44         |                               |             |

<sup>1</sup>Split season.

TABLE D-17. -- Total bags of ducks, by species, and coots and total non-retrieved ducks and coots in the ATLANTIC FLYWAY during the 1962 and the 1963 hunting seasons

[ Bag estimates adjusted for response bias]

| Species <sup>1</sup>              | 1962    | 1963      | Percent change |
|-----------------------------------|---------|-----------|----------------|
| <b>Ducks:</b>                     |         |           |                |
| <b>Dabblers:</b>                  |         |           |                |
| Mallard                           | 114,500 | 140,900   | +23            |
| Domestic mallard                  | 1,600   | 3,300     | +106           |
| Black duck                        | 208,900 | 217,900   | +4             |
| Black X Mallard                   | 6,300   | 6,100     | -3             |
| Mottled and                       |         |           |                |
| Florida duck                      | 13,600  | 17,300    | +27            |
| Gadwall                           | 5,900   | 17,800    | +202           |
| American widgeon                  | 27,400  | 40,800    | +49            |
| Green-winged teal                 | 42,500  | 61,800    | +45            |
| Blue-winged teal                  | 10,400  | 20,900    | +101           |
| Shoveler                          | 3,500   | 8,800     | +151           |
| Pintail                           | 16,500  | 27,100    | +64            |
| Wood duck                         | 116,600 | 125,000   | +7             |
| <b>Divers:</b>                    |         |           |                |
| Redhead                           | 400     | 1,400     | +250           |
| Canvasback                        | 200     | 300       | +50            |
| Greater scaup                     | 32,700  | 28,400    | -13            |
| Lesser scaup                      | 15,400  | 25,000    | +62            |
| Ring-necked duck                  | 46,500  | 68,600    | +48            |
| Goldeneye                         | 14,900  | 16,800    | +13            |
| Bufflehead                        | 14,200  | 18,800    | +32            |
| Ruddy duck                        | 3,600   | 5,000     | +39            |
| <b>Miscellaneous:</b>             |         |           |                |
| Common and red-breasted merganser | 6,100   | 8,100     | +33            |
| Hooded merganser                  | 11,600  | 15,600    | +34            |
| Oldsquaw and eider                | 4,100   | 2,800     | -32            |
| Scooter                           | 12,000  | 10,000    | -17            |
| Others and unknown                | 200     | 400       | +100           |
| <b>Total:</b>                     |         |           |                |
| Retrieved                         | 730,700 | 889,100   | +22            |
| Not retrieved                     | 198,400 | 220,400   | +11            |
| <b>Ducks killed</b>               |         |           |                |
|                                   | 929,100 | 1,109,500 | +19            |
| <b>Coots:</b>                     |         |           |                |
| Retrieved                         | 37,900  | 47,300    | +25            |
| Not retrieved                     | 11,100  | 15,700    | +41            |
| <b>Coots killed</b>               |         |           |                |
|                                   | 49,000  | 63,000    | +29            |

<sup>1</sup>Species composition derived from the 1962 and 1963 duck wing surveys.

TABLE D-18. --Total bags, by species, and crippling losses of geese in the ATLANTIC FLYWAY during the 1962 and 1963 hunting seasons

[ Bag estimates adjusted for response bias]

| Species        | 1962    | 1963    | Percent change |
|----------------|---------|---------|----------------|
| Geese:         |         |         |                |
| Canada goose   | 85,500  | 123,600 | +45            |
| American brant | 27,600  | 37,400  | +36            |
| Totals:        |         |         |                |
| Retrieved      | 113,100 | 161,000 | +42            |
| Not retrieved  | 18,400  | 27,300  | +48            |
| Geese killed   | 131,500 | 188,300 | +43            |

TABLE D-19.--Waterfowl hunting activity and bags of ducks and geese in the ATLANTIC FLYWAY during the 1963 hunting season, with 1962 season comparisons

[ Estimates unadjusted for response bias]

| Hunting season        | Duck bag limit | Days in duck season | Total active hunters | Hunter-days           |             | Duck bag                      |             | Goose bag                     |             |
|-----------------------|----------------|---------------------|----------------------|-----------------------|-------------|-------------------------------|-------------|-------------------------------|-------------|
|                       |                |                     |                      | Days per adult hunter | State total | Seasonal bag per adult hunter | State total | Seasonal bag per adult hunter | State total |
| <b>Connecticut:</b>   |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----            | 2-4            | 45 <sup>1</sup>     | 5,680                | 6.76                  | 38,100      | 4.95                          | 27,600      | 0.19                          | 1,100       |
| 1963 -----            | 3-6            | 45 <sup>1</sup>     | 5,680                | 5.85                  | 33,000      | 3.41                          | 19,000      | 0.17                          | 900         |
| Percent change -      |                |                     | 0                    | -14                   | -14         | -31                           | -31         | -11                           | -18         |
| <b>Delaware:</b>      |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----            | 2-4            | 48                  | 4,750                | 7.94                  | 37,500      | 4.74                          | 22,000      | 1.02                          | 4,700       |
| 1963 -----            | 3-6            | 45 <sup>1</sup>     | 5,970                | 7.77                  | 46,100      | 4.39                          | 25,700      | 2.62                          | 15,200      |
| Percent change -      |                |                     | +26                  | -2                    | +23         | -7                            | +17         | +157                          | +223        |
| <b>Florida:</b>       |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----            | 3-6            | 40                  | 15,910               | 6.02                  | 95,200      | 6.81                          | 106,100     | 0.04                          | 600         |
| 1963 -----            | 4-8            | 40                  | 20,390               | 5.97                  | 121,100     | 9.57                          | 191,200     | 0.03                          | 500         |
| Percent change -      |                |                     | +28                  | -1                    | +27         | +41                           | +80         | -25                           | -17         |
| <b>Georgia:</b>       |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----            | 3-6            | 40                  | 4,660                | 5.69                  | 26,300      | 6.37                          | 29,000      | 0.09                          | 400         |
| 1963 -----            | 4-8            | 40                  | 8,580                | 6.27                  | 53,500      | 8.16                          | 68,600      | 0.07                          | 600         |
| Percent change -      |                |                     | +84                  | +10                   | +103        | +28                           | +137        | -22                           | +50         |
| <b>Maine:</b>         |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----            | 2-4            | 45 <sup>1</sup>     | 6,810                | 6.37                  | 43,100      | 5.33                          | 35,500      | 0.03                          | 200         |
| 1963 -----            | 3-6            | 45 <sup>1</sup>     | 8,070                | 5.96                  | 47,800      | 4.87                          | 38,500      | 0.08                          | 600         |
| Percent change -      |                |                     | +19                  | -6                    | +11         | -9                            | +9          | +167                          | +200        |
| <b>Maryland:</b>      |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----            | 2-4            | 50                  | 15,740               | 7.70                  | 117,200     | 4.45                          | 66,500      | 3.29                          | 48,900      |
| 1963 -----            | 3-6            | 50                  | 18,460               | 6.84                  | 123,700     | 3.40                          | 64,900      | 3.22                          | 57,100      |
| Percent change -      |                |                     | +17                  | -11                   | +6          | -24                           | -2          | -2                            | +17         |
| <b>Massachusetts:</b> |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----            | 2-4            | 45                  | 12,940               | 6.12                  | 78,700      | 3.25                          | 41,200      | 0.23                          | 2,900       |
| 1963 -----            | 3-6            | 45                  | 15,630               | 5.76                  | 89,500      | 3.52                          | 53,900      | 0.15                          | 2,200       |
| Percent change -      |                |                     | +21                  | -6                    | +14         | +8                            | +31         | -35                           | -24         |

<sup>1</sup>Split season.

TABLE D-19. --Waterfowl hunting activity and bags of ducks and geese in the ATLANTIC FLYWAY during the 1963 hunting season, with 1962 season comparisons (continued)

[ Estimates unadjusted for response bias]

| Hunting season   | Duck bag limit | Days in duck season | Total active hunters | Hunter-days           |             | State total | Duck bag                      |             | Goose bag                     |             |
|------------------|----------------|---------------------|----------------------|-----------------------|-------------|-------------|-------------------------------|-------------|-------------------------------|-------------|
|                  |                |                     |                      | Days per adult hunter | State total |             | Seasonal bag per adult hunter | State total | Seasonal bag per adult hunter | State total |
| New Hampshire:   |                |                     |                      |                       |             |             |                               |             |                               |             |
| 1962 -----       | 3-6            | 36                  | 3,400                | 5.90                  | 19,900      | 3.04        | 10,100                        | 0.04        | 100                           |             |
| 1963 -----       | 3-6            | 50                  | 2,730                | 5.99                  | 16,200      | 3.61        | 9,600                         | 0.11        | 300                           |             |
| Percent change - |                |                     | -20                  | +2                    | -19         | +19         | -5                            | +175        | +200                          |             |
| New Jersey:      |                |                     |                      |                       |             |             |                               |             |                               |             |
| 1962 -----       | 2-4            | 50                  | 15,870               | 6.36                  | 100,300     | 5.05        | 78,500                        | 1.75        | 26,900                        |             |
| 1963 -----       | 3-6            | 45                  | 18,120               | 6.76                  | 121,800     | 5.65        | 100,300                       | 1.93        | 36,800                        |             |
| Percent change - |                |                     | +14                  | +6                    | +21         | +12         | +28                           | +10         | +26                           |             |
| New York:        |                |                     |                      |                       |             |             |                               |             |                               |             |
| 1962 -----       | 2-4            | 45                  | 36,330               | 6.45                  | 233,000     | 4.58        | 163,200                       | 0.24        | 8,600                         |             |
| 1963 -----       | 3-6            | 50                  | 28,370               | 7.03                  | 198,300     | 4.85        | 134,800                       | 0.93        | 25,400                        |             |
| Percent change - |                |                     | -22                  | +9                    | -15         | +6          | -17                           | +288        | +195                          |             |
| North Carolina:  |                |                     |                      |                       |             |             |                               |             |                               |             |
| 1962 -----       | 2-4            | 50                  | 17,380               | 5.26                  | 90,900      | 3.30        | 56,100                        | 1.81        | 30,400                        |             |
| 1963 -----       | 3-6            | 50                  | 19,040               | 5.92                  | 112,000     | 3.87        | 72,400                        | 1.75        | 32,200                        |             |
| Percent change - |                |                     | +10                  | +13                   | +23         | +17         | +29                           | -3          | +6                            |             |
| Pennsylvania:    |                |                     |                      |                       |             |             |                               |             |                               |             |
| 1962 -----       | 2-4            | 50                  | 24,550               | 4.78                  | 116,600     | 2.52        | 60,600                        | 0.16        | 3,900                         |             |
| 1963 -----       | 3-6            | 50                  | 28,400               | 4.60                  | 129,900     | 2.74        | 76,200                        | 0.28        | 7,700                         |             |
| Percent change - |                |                     | +16                  | -4                    | +11         | +9          | +26                           | +75         | +97                           |             |
| Rhode Island:    |                |                     |                      |                       |             |             |                               |             |                               |             |
| 1962 -----       | 2-4            | 50                  | 1,450                | 8.41                  | 12,100      | 4.90        | 7,000                         | 0.08        | 100                           |             |
| 1963 -----       | 3-6            | 50                  | 1,920                | 7.85                  | 15,000      | 5.33        | 10,000                        | 0.07        | 100                           |             |
| Percent change - |                |                     | +32                  | -7                    | +24         | +9          | +43                           | -13         | 0                             |             |
| South Carolina:  |                |                     |                      |                       |             |             |                               |             |                               |             |
| 1962 -----       | 3-6            | 40                  | 9,330                | 7.12                  | 66,100      | 6.41        | 58,700                        | 0.13        | 1,200                         |             |
| 1963 -----       | 3-6            | 50                  | 11,560               | 6.45                  | 74,100      | 6.64        | 75,200                        | 0.22        | 2,500                         |             |
| Percent change - |                |                     | +24                  | -9                    | +12         | +4          | +28                           | +69         | +108                          |             |

TABLE D-19.--Waterfowl hunting activity and bags of ducks and geese in the ATLANTIC FLYWAY during the 1963 hunting season, with 1962 season comparisons (continued)

[ Estimates unadjusted for response bias]

| Hunting season        | Duck bag limit | Days in duck season | Total active hunters | Hunter-days           |             | Duck bag                      |             | Goose bag                     |             |
|-----------------------|----------------|---------------------|----------------------|-----------------------|-------------|-------------------------------|-------------|-------------------------------|-------------|
|                       |                |                     |                      | Days per adult hunter | State total | Seasonal bag per adult hunter | State total | Seasonal bag per adult hunter | State total |
| <b>Vermont:</b>       |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----            | 3-6            | 40                  | 3,110                | 7.75                  | 23,900      | 8.06                          | 24,500      | 0.04                          | 100         |
| 1963 -----            | 3-6            | 45                  | 2,730                | 5.19                  | 14,100      | 5.39                          | 14,400      | 0.10                          | 300         |
| Percent change -      |                |                     | -12                  | -33                   | -41         | -33                           | -41         | +150                          | +200        |
| <b>Virginia:</b>      |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----            | 2-4            | 50                  | 10,830               | 5.52                  | 58,600      | 4.78                          | 49,500      | 0.93                          | 10,200      |
| 1963 -----            | 3-6            | 50                  | 14,460               | 5.36                  | 76,800      | 4.52                          | 65,400      | 1.43                          | 20,600      |
| Percent change -      |                |                     | +34                  | -3                    | +31         | -5                            | +32         | +54                           | +102        |
| <b>West Virginia:</b> |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----            | 2-4            | 45                  | 1,210                | 5.97                  | 7,200       | 3.90                          | 4,600       | 0.31                          | 400         |
| 1963 -----            | 3-6            | 45                  | 990                  | 2.78                  | 2,700       | 2.79                          | 2,700       | 0.17                          | 200         |
| Percent change -      |                |                     | -18                  | -53                   | -63         | -29                           | -41         | -45                           | -50         |
| <b>Flyway total:</b>  |                |                     |                      |                       |             |                               |             |                               |             |
| 1962 -----            |                |                     | 189,940              | 6.17                  | 1,164,900   | 4.52                          | 840,600     | 0.76                          | 140,600     |
| 1963 -----            |                |                     | 211,100              | 6.09                  | 1,275,900   | 4.84                          | 1,022,900   | 1.00                          | 200,200     |
| Percent change        |                |                     | +11                  | -1                    | +10         | +7                            | +22         | +32                           | +42         |

TABLE D-20. --Age ratios of mallard determined from wing collections, during hunting seasons 1960-61, 1962-63, and 1963-64

| Location of kill                         | Number of--    |         |         |                     |         |         |
|--|----------------|---------|---------|---------------------|---------|---------|
|  | Wings received |         |         | Immatures per adult |         |         |
|  | 1961-62        | 1962-63 | 1963-64 | 1961-62             | 1962-63 | 1963-64 |
| Pacific Flyway:                          |                |         |         |                     |         |         |
| Washington -----                         | 1,259          | 1,739   | 2,208   | 1.1                 | 1.0     | 1.5     |
| Oregon -----                             | 656            | 577     | 1,129   | 1.8                 | 1.5     | 1.8     |
| Idaho -----                              | 715            | 1,328   | 2,454   | 0.9                 | 1.0     | 1.1     |
| California -----                         | 679            | 734     | 1,563   | 1.5                 | 1.8     | 2.2     |
| Nevada -----                             | 149            | 178     | 586     | 1.7                 | 2.0     | 2.2     |
| Utah -----                               | 217            | 708     | 1,039   | 2.0                 | 1.9     | 1.9     |
| Arizona -----                            | 17             | 59      | 82      | --                  | 2.1     | 2.2     |
| Flyway weighted ratio <sup>2</sup> ----- | --             | --      | --      | 1.22                | 1.25    | 2.2     |
| Central Flyway:                          |                |         |         |                     |         |         |
| Montana <sup>3</sup> (E) -----           | 599            | 165     | 269     | 1.2                 | 2.1     | 1.1     |
| (W) -----                                | 482            | 571     | 662     | 1.2                 | 1.2     | 2.5     |
| North Dakota -----                       | 531            | 988     | 1,360   | 1.1                 | 1.2     | 1.1     |
| South Dakota -----                       | 145            | 493     | 1,579   | 0.5                 | 1.0     | 1.2     |
| Wyoming (E) -----                        | 57             | 70      | 138     | 1.4                 | 1.5     | 0.8     |
| (W) -----                                | 12             | 352     | 556     | -- <sup>1</sup>     | 1.1     | 1.0     |
| Nebraska -----                           | 1,210          | 205     | 736     | 0.5                 | 0.5     | 0.8     |
| Colorado (E) -----                       | 840            | 403     | 1,255   | 0.4                 | 0.7     | 0.6     |
| (W) -----                                | 101            | 249     | 229     | 0.3                 | 0.8     | 0.8     |
| Kansas -----                             | 509            | 315     | 318     | 0.6                 | 1.0     | 0.7     |
| New Mexico -----                         | 140            | 98      | 278     | 0.8                 | 0.8     | 1.4     |
| Oklahoma -----                           | 129            | 204     | 279     | 0.7                 | 0.6     | 1.0     |
| Texas -----                              | 139            | 620     | 624     | 0.6                 | 0.8     | 0.8     |
| Flyway weighted ratio <sup>2</sup> ----- | --             | --      | --      | 0.69                | 0.94    | 1.03    |
| Mississippi Flyway:                      |                |         |         |                     |         |         |
| Minnesota -----                          | 768            | 1,722   | 2,325   | 1.5                 | 2.2     | 2.1     |
| Wisconsin -----                          | 772            | 1,798   | 1,788   | 2.0                 | 2.7     | 2.2     |
| Michigan -----                           | 450            | 706     | 687     | 3.0                 | 3.2     | 2.8     |
| Iowa -----                               | 560            | 329     | 578     | 1.0                 | 1.6     | 1.1     |
| Illinois -----                           | 1,007          | 549     | 890     | 0.8                 | 1.0     | 1.1     |
| Indiana -----                            | 210            | 178     | 278     | 0.8                 | 1.1     | 1.4     |
| Ohio -----                               | 197            | 267     | 388     | 2.5                 | 2.2     | 1.9     |
| Missouri -----                           | 597            | 331     | 628     | 1.0                 | 0.8     | 0.9     |
| Kentucky -----                           | 373            | 202     | 257     | 0.7                 | 0.8     | 1.2     |
| Arkansas -----                           | 512            | 896     | 1,143   | 0.5                 | 0.7     | 0.7     |
| Tennessee -----                          | 503            | 224     | 316     | 0.6                 | 0.8     | 1.1     |
| Louisiana -----                          | 216            | 830     | 965     | 0.3                 | 0.7     | 0.9     |
| Mississippi -----                        | 135            | 204     | 298     | 0.6                 | 0.8     | 0.7     |
| Alabama -----                            | 48             | 188     | 389     | 0.7                 | 0.6     | 1.3     |
| Flyway weighted ratio <sup>2</sup> ----- | --             | --      | --      | 1.08                | 1.40    | 1.30    |
| Atlantic Flyway:                         |                |         |         |                     |         |         |
| Maine -----                              | 10             | 25      | 39      | -- <sup>1</sup>     | 7.3     | 3.2     |
| Vermont -----                            | 44             | 42      | 82      | 3.0                 | 3.2     | 5.4     |
| New Hampshire -----                      | 11             | 7       | 11      | --                  | --      | --      |
| Massachusetts -----                      | 42             | 92      | 85      | 3.2                 | 1.7     | 1.5     |
| Connecticut -----                        | 65             | 102     | 100     | 4.0                 | 2.2     | 1.6     |
| Rhode Island -----                       | 22             | 27      | 19      | 3.4                 | 0.6     | 1.4     |
| New York -----                           | 343            | 337     | 598     | 3.8                 | 2.1     | 3.0     |
| Pennsylvania -----                       | 124            | 481     | 667     | 2.9                 | 2.1     | 2.3     |
| West Virginia -----                      | 20             | 50      | 59      | 1.2                 | 1.8     | 1.9     |
| New Jersey -----                         | 147            | 306     | 337     | 1.3                 | 1.6     | 1.8     |
| Delaware -----                           | 54             | 104     | 121     | 1.1                 | 1.0     | 1.4     |

TABLE D-20. --Age ratios of mallard determined from wing collections, during hunting seasons 1960-61, 1962-63, and 1963-64 (continued)

| Location of kill                                      | Number of--    |         |         |                     |         |         |
|---|----------------|---------|---------|---------------------|---------|---------|
|   | Wings received |         |         | Immatures per adult |         |         |
|   | 1961-62        | 1962-63 | 1963-64 | 1961-62             | 1962-63 | 1963-64 |
| <b>Atlantic Flyway: (cont'd)</b>                      |                |         |         |                     |         |         |
| Maryland -----  | 66             | 311     | 245     | 1.4                 | 1.2     | 1.2     |
| Virginia -----  | 105            | 174     | 225     | 0.8                 | 1.0     | 0.8     |
| North Carolina -----                                  | 48             | 101     | 127     | 0.9                 | 0.9     | 1.2     |
| South Carolina -----                                  | 101            | 98      | 165     | 0.6                 | 1.3     | 1.2     |
| Georgia -----   | 1              | 28      | 44      | --                  | 1.0     | 1.5     |
| Florida -----   | 21             | 33      | 56      | 2.5                 | 1.2     | 2.4     |
| Flyway weighted ratio <sup>2</sup> -----              | --             | --      | --      | 1.95                | 1.53    | 1.72    |
| Continental United States weighted ratio <sup>2</sup> |                |         |         | 1.05                | 1.26    | 1.36    |

<sup>1</sup>Ratio not shown if based on less than 20 wings.

<sup>2</sup>In estimating flyway and United States ratios, the ratio for each State was weighted in proportion to the estimated size of the kill in that State.

<sup>3</sup>E-East, W-west of the Continental Divide.

TABLE D-21.--Age ratios of black duck determined from wing collections, during hunting seasons 1960-61, 1961-62, 1962-63, and 1963-64

| Location of kill                                      | Number of--    |         |         |         |                     |         |         |         |
|---|----------------|---------|---------|---------|---------------------|---------|---------|---------|
|   | Wings received |         |         |         | Immatures per adult |         |         |         |
|   | 1960-61        | 1961-62 | 1962-63 | 1963-64 | 1960-61             | 1961-62 | 1962-63 | 1963-64 |
| <b>Mississippi Flyway:</b>                            |                |         |         |         |                     |         |         |         |
| Minnesota -----                                       | 50             | 8       | 44      | 42      | 2.3                 | --      | 3.0     | 6.0     |
| Wisconsin -----                                       | 114            | 89      | 220     | 156     | 3.4                 | 3.5     | 1.7     | 1.5     |
| Michigan -----  | 216            | 200     | 338     | 261     | 2.0                 | 2.5     | 1.6     | 1.3     |
| Iowa -----  | 8              | 3       | 5       | 11      | --                  | --      | --      | --      |
| Illinois -----  | 30             | 52      | 48      | 50      | 2.0                 | 1.4     | 1.5     | 1.0     |
| Indiana -----   | 141            | 55      | 57      | 87      | 1.2                 | 1.1     | 1.7     | 1.1     |
| Ohio -----  | 207            | 62      | 110     | 194     | 1.2                 | 1.5     | 1.3     | 0.7     |
| Missouri -----  | 14             | 4       | 3       | 9       | --                  | --      | --      | --      |
| Kentucky -----  | 141            | 126     | 96      | 67      | 1.1                 | 1.0     | 1.1     | 0.7     |
| Arkansas -----  | 27             | 8       | 3       | 11      | 2.0                 | --      | --      | --      |
| Tennessee -----                                       | 241            | 67      | 85      | 161     | 1.3                 | 1.0     | 1.2     | 0.9     |
| Louisiana -----                                       | 13             | 3       | 19      | 19      | --                  | --      | --      | --      |
| Mississippi -----                                     | 32             | 7       | 11      | 11      | 2.6                 | --      | --      | --      |
| Alabama -----   | 41             | 9       | 75      | 108     | 1.9                 | --      | 0.7     | 0.5     |
| Flyway weighted ratio <sup>2</sup>                    | ---            | ---     | ---     | ---     | 1.83                | 2.04    | 1.49    | 1.11    |
| <b>Atlantic Flyway:</b>                               |                |         |         |         |                     |         |         |         |
| Maine -----   | 878            | 379     | 564     | 797     | 3.0                 | 1.8     | 1.7     | 2.1     |
| Vermont -----   | 233            | 186     | 232     | 237     | 5.5                 | 3.8     | 3.5     | 4.6     |
| New Hampshire -----                                   | 71             | 72      | 193     | 195     | 4.9                 | 3.5     | 2.8     | 3.4     |
| Massachusetts -----                                   | 636            | 329     | 566     | 639     | 2.2                 | 1.8     | 1.6     | 1.8     |
| Connecticut -----                                     | 183            | 122     | 294     | 209     | 2.4                 | 2.1     | 1.6     | 3.2     |
| Rhode Island -----                                    | 159            | 93      | 204     | 255     | 1.9                 | 1.0     | 1.1     | 1.7     |
| New York -----  | 435            | 418     | 524     | 613     | 2.7                 | 2.3     | 1.6     | 2.2     |
| Pennsylvania -----                                    | 163            | 73      | 277     | 251     | 3.0                 | 0.6     | 1.2     | 1.4     |
| West Virginia -----                                   | 66             | 26      | 65      | 60      | 0.6                 | 0.9     | 0.4     | 0.7     |
| New Jersey -----                                      | 1,132          | 712     | 1,152   | 1,157   | 1.9                 | 1.6     | 1.0     | 1.1     |
| Delaware -----  | 200            | 122     | 259     | 276     | 1.2                 | 2.0     | 1.6     | 1.4     |
| Maryland -----  | 378            | 131     | 557     | 396     | 1.4                 | 2.2     | 1.0     | 1.1     |
| Virginia -----  | 161            | 148     | 247     | 277     | 1.6                 | 1.1     | 1.0     | 1.1     |
| North Carolina -----                                  | 228            | 59      | 93      | 104     | 1.5                 | 1.7     | 1.0     | 1.1     |
| South Carolina -----                                  | 46             | 53      | 54      | 95      | 1.6                 | 1.0     | 1.1     | 1.4     |
| Georgia -----   | 2              | ---     | 1       | 8       | 20                  | --      | --      | 0.7     |
| Florida -----   | 25             | 24      | 25      | 47      | 4.0                 | 3.0     | 2.1     | 1.9     |
| Flyway weighted ratio <sup>2</sup>                    | ---            | ---     | ---     | ---     | 2.11                | 1.75    | 1.32    | 1.51    |
| Continental United States weighted ratio <sup>2</sup> |                |         |         |         | 2.00                | 1.82    | 1.35    | 1.38    |

<sup>1</sup>Ratio not shown if based on less than 20 wings.

<sup>2</sup>In estimating Flyway and United States ratios, the ratio for each State was weighted in proportion to the estimated size of the kill in that State.

TABLE D-22. --Age ratios of blue-winged and cinnamon teal determined from wing collections, during hunting seasons 1960-61, 1961-62, 1962-63, and 1963-64

| Location of kill                                      | Number of--    |         |         |                     |         |         |
|---|----------------|---------|---------|---------------------|---------|---------|
|   | Wings received |         |         | Immatures per adult |         |         |
|   | 1961-62        | 1962-63 | 1963-64 | 1961-62             | 1962-63 | 1963-64 |
| <b>Central Flyway:</b>                                |                |         |         |                     |         |         |
| Montana -----   | 21             | 1       | 11      | 6.0                 | --      | --      |
| North Dakota -----                                    | 8              | 79      | 144     | --                  | 3.2     | 3.8     |
| South Dakota -----                                    | 3              | 22      | 318     | --                  | 3.4     | 2.2     |
| Wyoming -----   | 8              | 1       | 4       | --                  | --      | --      |
| Nebraska -----  | 5              | 7       | 127     | --                  | --      | 4.0     |
| Colorado -----  | 1              | --      | 4       | --                  | --      | --      |
| Kansas -----  | 6              | 6       | 50      | --                  | --      | 3.8     |
| New Mexico -----                                      | 32             | --      | 1       | 31.0                | --      | --      |
| Oklahoma -----  | 1              | 1       | 3       | --                  | --      | --      |
| Texas -----   | 11             | 46      | 38      | --                  | 0.4     | 0.8     |
| Flyway weighted ratio <sup>2</sup> -----              | --             | --      | --      | 3.64                | 2.11    | 2.69    |
| <b>Mississippi Flyway:</b>                            |                |         |         |                     |         |         |
| Minnesota -----                                       | 45             | 343     | 841     | 2.8                 | 1.7     | 4.3     |
| Wisconsin -----                                       | 50             | 294     | 799     | 1.9                 | 3.6     | 4.5     |
| Michigan -----  | 52             | 75      | 190     | 1.6                 | 2.8     | 6.6     |
| Iowa -----  | 7              | 7       | 349     | -- <sup>1</sup>     | --      | 4.7     |
| Illinois -----  | 4              | 13      | 6       | --                  | --      | --      |
| Indiana -----   | --             | 7       | 0       | --                  | --      | --      |
| Ohio -----  | 10             | 23      | 44      | --                  | 6.7     | 13.0    |
| Missouri -----  | 0              | 5       | 33      | --                  | --      | 5.0     |
| Kentucky -----  | --             | 1       | --      | --                  | --      | --      |
| Arkansas -----  | 1              | --      | --      | --                  | --      | --      |
| Tennessee -----                                       | 0              | --      | 1       | --                  | --      | --      |
| Louisiana -----                                       | 83             | 123     | 165     | 0.8                 | 0.4     | 0.7     |
| Mississippi -----                                     | --             | 1       | 1       | --                  | --      | --      |
| Alabama -----   | 2              | 5       | 12      | --                  | --      | --      |
| Flyway weighted ratio <sup>2</sup> -----              | --             | --      | --      | 1.69                | 1.65    | 3.13    |
| Continental United States weighted ratio <sup>2</sup> |                |         |         | 1.83                | 1.40    | 2.41    |

<sup>1</sup>Ratio not shown if based on less than 20 wings.

<sup>2</sup>In estimating Flyway and United States ratios, the ratio for each State was weighted in proportion to the estimated size of the kill in that State.

TABLE D-23.--Age ratios of pintail determined from wing collections, during hunting seasons 1960-61, 1961-62, 1962-63, and 1963-64

| Location of kill                                      | Number of--    |         |         |                     |         |         |
|---|----------------|---------|---------|---------------------|---------|---------|
|   | Wings received |         |         | Immatures per adult |         |         |
|   | 1961-62        | 1962-63 | 1963-64 | 1961-62             | 1962-63 | 1963-64 |
| Pacific Flyway:                                       |                |         |         |                     |         |         |
| Washington -----                                      | 167            | 393     | 491     | 1.5                 | 2.5     | 1.8     |
| Oregon -----  | 137            | 287     | 471     | 1.4                 | 1.8     | 2.1     |
| Idaho -----   | 46             | 71      | 136     | 1.6                 | 1.4     | 2.7     |
| California -----                                      | 1,350          | 1,675   | 2,809   | 0.5                 | 1.0     | 1.1     |
| Nevada -----  | 29             | 44      | 118     | 2.2                 | 1.4     | 2.1     |
| Utah -----  | 103            | 563     | 620     | 0.4                 | 0.7     | 0.9     |
| Arizona -----   | 16             | 29      | 47      | --                  | 2.6     | 1.6     |
| Flyway weighted ratio <sup>2</sup> -----              | --             | --      | --      | 0.59                | 1.09    | 1.22    |
| Central Flyway:                                       |                |         |         |                     |         |         |
| Montana <sup>3</sup> (E)-----                         | 37             | 21      | 45      | 0.2                 | 0.9     | 3.1     |
| (W)-----  | 29             | 26      | 20      | 0.3                 | 2.3     | 5.7     |
| North Dakota -----                                    | 27             | 115     | 240     | 8.0                 | 2.1     | 3.4     |
| South Dakota -----                                    | 11             | 136     | 356     | -- <sup>1</sup>     | 2.0     | 2.3     |
| Wyoming (E)-----                                      | 3              | --      | 5       | --                  | --      | --      |
| (W)-----  | 1              | 6       | 10      | --                  | --      | --      |
| Nebraska -----  | 37             | 30      | 112     | 5.2                 | 0.9     | 1.3     |
| Colorado (E)-----                                     | 10             | 20      | 54      | --                  | 1.9     | 3.2     |
| (W)-----  | --             | 3       | 4       | --                  | --      | --      |
| Kansas -----  | 119            | 73      | 82      | 2.8                 | 2.5     | 1.9     |
| New Mexico -----                                      | 24             | 3       | 29      | 1.4                 | --      | 0.5     |
| Oklahoma -----  | 18             | 21      | 22      | --                  | 1.1     | 1.9     |
| Texas -----   | 125            | 551     | 580     | 0.5                 | 0.6     | 0.8     |
| Flyway weighted ratio <sup>2</sup> -----              | --             | --      | --      | 1.25                | 1.09    | 1.40    |
| Mississippi Flyway:                                   |                |         |         |                     |         |         |
| Minnesota -----                                       | 57             | 94      | 216     | 1.9                 | 1.8     | 3.2     |
| Wisconsin -----                                       | 53             | 253     | 180     | 3.4                 | 2.8     | 3.6     |
| Michigan -----  | 53             | 50      | 50      | 3.1                 | 1.6     | 6.1     |
| Iowa -----  | 31             | 29      | 93      | 14.5                | 2.6     | 2.2     |
| Illinois -----  | 68             | 64      | 78      | 3.3                 | 2.2     | 1.8     |
| Indiana -----   | 4              | 10      | 6       | --                  | --      | --      |
| Ohio -----  | 21             | 58      | 50      | 2.0                 | 2.9     | 4.3     |
| Missouri -----  | 46             | 62      | 89      | 4.1                 | 3.1     | 2.4     |
| Kentucky -----  | --             | 0       | 1       | --                  | --      | --      |
| Arkansas -----  | 3              | 12      | 14      | --                  | --      | --      |
| Tennessee -----                                       | 7              | 6       | 15      | --                  | --      | --      |
| Louisiana -----                                       | 187            | 343     | 240     | 0.6                 | 0.6     | 0.9     |
| Mississippi -----                                     | 10             | 5       | 9       | --                  | --      | --      |
| Alabama -----   | 31             | 73      | 93      | 1.1                 | 0.4     | 1.0     |
| Flyway weighted ratio <sup>2</sup> -----              | --             | --      | --      | 1.52                | 1.30    | 1.59    |
| Continental United States weighted ratio <sup>2</sup> |                |         |         | 0.76                | 1.10    | 1.29    |

<sup>1</sup>Ratio not shown if based on less than 20 wings.

<sup>2</sup>In estimating flyway and United States ratios, the ratio for each State was weighted in proportion to the estimated size of the kill in that State.

<sup>3</sup>E-East, W-west of the Continental Divide.

TABLE D-24. --Age ratios of wood duck determined from wing collections,  
during hunting seasons 1960-61, 1961-62, 1962-63, and 1963-64

| Location of kill                                      | Number of--    |         |         |         |                     |         |         |         |      |
|---|----------------|---------|---------|---------|---------------------|---------|---------|---------|------|
|   | Wings received |         |         |         | Immatures per adult |         |         |         |      |
|   | 1960-61        | 1961-62 | 1962-63 | 1963-64 | 1960-61             | 1961-62 | 1962-63 | 1963-64 |      |
| <b>Mississippi Flyway:</b>                            |                |         |         |         |                     |         |         |         |      |
| Minnesota -----                                       | 81             | 72      | 308     | 790     | 3.0                 | 3.2     | 1.8     | 2.6     |      |
| Wisconsin -----                                       | 184            | 140     | 717     | 1,113   | 2.0                 | 2.2     | 1.1     | 1.5     |      |
| Michigan -----  | 76             | 86      | 333     | 424     | 1.6                 | 2.0     | 1.0     | 2.0     |      |
| Iowa -----  | 73             | 56      | 95      | 406     | 2.8                 | 3.7     | 2.4     | 2.2     |      |
| Illinois -----  | 74             | 102     | 193     | 209     | 3.6                 | 1.6     | 1.1     | 2.2     |      |
| Indiana -----   | 43             | 50      | 147     | 72      | 1.9                 | 1.6     | 1.3     | 2.8     |      |
| Ohio -----  | 118            | 129     | 462     | 417     | 2.5                 | 2.2     | 1.8     | 2.6     |      |
| Missouri -----  | 34             | 30      | 64      | 125     | 7.5                 | 2.3     | 1.4     | 1.9     |      |
| Kentucky -----  | 11             | 6       | 23      | 13      | --                  | --      | 0.6     | --      |      |
| Arkansas -----  | 64             | 8       | 143     | 234     | 1.0                 | --      | 1.0     | 1.0     |      |
| Tennessee -----                                       | 40             | 28      | 22      | 15      | 1.0                 | 2.1     | 1.2     | 1.4     |      |
| Louisiana -----                                       | 85             | 58      | 466     | 240     | 1.7                 | 1.4     | 1.3     | 1.6     |      |
| Mississippi -----                                     | 70             | 23      | 159     | 9       | 0.7                 | 0.8     | 0.6     | 1.3     |      |
| Alabama -----   | 91             | 29      | 117     | 93      | 1.6                 | 1.1     | 0.7     | 1.2     |      |
| Flyway weighted ratio <sup>2</sup>                    | --             | --      | --      | --      | 2.06                | 2.11    | 1.25    | 1.81    |      |
| <b>Atlantic Flyway:</b>                               |                |         |         |         |                     |         |         |         |      |
| Maine -----   | 190            | 111     | 108     | 158     | 1.6                 | 1.6     | 1.8     | 1.1     |      |
| Vermont -----   | 96             | 68      | 111     | 96      | 1.9                 | 2.2     | 1.6     | 3.0     |      |
| New Hampshire -----                                   | 10             | 48      | 121     | 59      | -- <sup>1</sup>     | 1.7     | 2.0     | 1.4     |      |
| Massachusetts -----                                   | 30             | 83      | 114     | 57      | 2.3                 | 2.3     | 1.0     | 2.9     |      |
| Connecticut -----                                     | 32             | 7       | 63      | 39      | 3.6                 | --      | 1.3     | 2.0     |      |
| Rhode Island -----                                    | --             | 1       | --      | 7       | --                  | --      | --      | --      |      |
| New York -----  | 333            | 516     | 357     | 71      | 1.9                 | 1.8     | 1.7     | 3.1     |      |
| Pennsylvania -----                                    | 88             | 41      | 215     | 397     | 2.5                 | 1.6     | 1.8     | 1.8     |      |
| West Virginia -----                                   | 43             | 22      | 49      | 19      | 3.8                 | 2.7     | 1.2     | --      |      |
| New Jersey -----                                      | 4              | 4       | 56      | 69      | --                  | --      | 1.3     | 2.1     |      |
| Delaware -----  | 1              | 5       | 1       | 27      | --                  | --      | --      | 1.8     |      |
| Maryland -----  | 8              | 12      | 32      | 29      | --                  | --      | 1.5     | 1.0     |      |
| Virginia -----  | 43             | 110     | 87      | 84      | 3.8                 | 1.2     | 1.8     | 1.1     |      |
| North Carolina -----                                  | 189            | 164     | 202     | 185     | 2.2                 | 2.2     | 1.3     | 1.8     |      |
| South Carolina -----                                  | 131            | 112     | 155     | 226     | 1.7                 | 1.3     | 1.1     | 1.1     |      |
| Georgia -----   | 17             | 10      | 61      | 192     | --                  | --      | 0.7     | 1.4     |      |
| Florida -----   | 60             | 85      | 336     | 462     | 2.5                 | 0.9     | 1.0     | 1.4     |      |
| Flyway weighted ratio <sup>2</sup>                    | --             | --      | --      | --      | 2.10                | 1.66    | 1.29    | 1.48    |      |
| Continental United States weighted ratio <sup>2</sup> |                |         |         |         |                     |         | 1.83    | 1.28    | 1.70 |

<sup>1</sup>Ratio not shown if based on less than 20 wings.

<sup>2</sup>In estimating Flyway and United States ratios the ratio for each State was weighted in proportion to the estimated size of the kill in that State.

TABLE D-25.--Species composition of geese in the goose kill indicated by the goose-tail collection survey during the 1962-63 and 1963-64 hunting seasons

| State                 | Canada geese |       | Lesser snow goose |       | Blue goose |       | White-fronted goose |       | Brants |      | Total |       | Sample |      |
|-----------------------|--------------|-------|-------------------|-------|------------|-------|---------------------|-------|--------|------|-------|-------|--------|------|
|                       | 1962         | 1963  | 1962              | 1963  | 1962       | 1963  | 1962                | 1963  | 1962   | 1963 | 1962  | 1963  | 1962   | 1963 |
| Pacific Flyway:       |              |       |                   |       |            |       |                     |       |        |      |       |       |        |      |
| Washington -----      | 86.9         | 84.0  | 8.1               | 8.8   | --         | --    | 1.2                 | 0.2   | 3.8    | 6.9  | 100.0 | 99.9  | 260    | 407  |
| Oregon -----          | 84.5         | 77.8  | 11.2              | 4.9   | --         | --    | 4.3                 | 17.1  | --     | 0.2  | 100.0 | 100.0 | 116    | 428  |
| Idaho -----           | 98.2         | 98.2  | --                | 1.8   | 1.8        | --    | --                  | --    | --     | --   | 100.0 | 100.0 | 57     | 165  |
| California -----      | 37.8         | 41.5  | 20.5              | 27.4  | --         | --    | 35.4                | 27.0  | 6.3    | 4.1  | 100.0 | 100.0 | 633    | 892  |
| Nevada -----          | 100.0        | 94.1  | --                | 2.9   | --         | --    | --                  | 2.9   | --     | --   | 100.0 | 99.9  | 7      | 68   |
| Utah -----            | 96.3         | 98.4  | 3.7               | 1.6   | --         | --    | --                  | --    | --     | --   | 100.0 | 100.0 | 54     | 64   |
| Arizona -----         | 83.3         | 100.0 | 16.7              | --    | --         | --    | --                  | --    | --     | --   | 100.0 | 100.0 | 18     | 28   |
| Flyway weighted ----- | 54.42        | 55.50 | 16.30             | 20.28 | 0.07       | --    | 24.52               | 20.85 | 4.69   | 3.37 | 100.0 | 100.0 | --     | --   |
| Central Flyway:       |              |       |                   |       |            |       |                     |       |        |      |       |       |        |      |
| Montana -----         | 56.9         | 51.2  | 43.1              | 47.3  | --         | 1.6   | --                  | --    | --     | --   | 100.0 | 100.1 | 72     | 129  |
| North Dakota -----    | 48.9         | 49.8  | 37.0              | 27.4  | 12.7       | 6.2   | 1.4                 | 16.2  | --     | 0.4  | 100.0 | 100.0 | 284    | 241  |
| South Dakota -----    | 23.1         | 39.5  | 48.1              | 37.2  | 27.5       | 21.9  | 1.4                 | 1.4   | --     | 0.1  | 100.1 | 100.1 | 516    | 810  |
| Wyoming -----         | 100.0        | 100.0 | --                | --    | --         | --    | --                  | --    | --     | --   | 100.0 | 100.0 | 26     | 96   |
| Nebraska -----        | 47.5         | 74.8  | 20.2              | 5.4   | 25.3       | 1.8   | 7.1                 | 18.0  | --     | --   | 100.1 | 100.0 | 99     | 111  |
| Colorado -----        | 100.0        | 99.2  | --                | 0.8   | --         | --    | --                  | --    | --     | --   | 100.0 | 100.0 | 186    | 256  |
| Kansas -----          | 36.0         | 50.0  | 29.7              | 22.2  | 18.0       | 11.1  | 16.3                | 16.7  | --     | --   | 100.0 | 100.0 | 111    | 18   |
| New Mexico -----      | 93.3         | 89.6  | 6.7               | 10.4  | --         | --    | --                  | --    | --     | --   | 100.0 | 100.0 | 15     | 115  |
| Oklahoma -----        | 77.0         | 74.8  | 12.2              | 13.1  | 6.8        | 8.4   | 4.1                 | 3.7   | --     | --   | 100.1 | 100.0 | 74     | 107  |
| Texas -----           | 42.1         | 27.3  | 28.6              | 42.3  | 8.1        | 15.9  | 21.2                | 14.5  | --     | --   | 100.0 | 100.0 | 632    | 433  |
| Flyway weighted ----- | 42.92        | 43.07 | 31.94             | 32.87 | 13.19      | 12.68 | 11.95               | 11.29 | --     | 0.09 | 100.0 | 100.0 | --     | --   |
| Mississippi Flyway:   |              |       |                   |       |            |       |                     |       |        |      |       |       |        |      |
| Minnesota -----       | 44.0         | 40.6  | 27.1              | 23.8  | 28.9       | 35.6  | --                  | --    | --     | --   | 100.0 | 100.0 | 166    | 160  |
| Wisconsin -----       | 95.5         | 89.9  | 1.1               | 2.8   | 3.4        | 7.0   | --                  | 0.2   | --     | --   | 100.0 | 99.9  | 177    | 527  |
| Michigan -----        | 94.0         | 100.0 | 1.2               | --    | 4.8        | --    | --                  | --    | --     | --   | 100.0 | 100.0 | 83     | 41   |
| Iowa -----            | 27.3         | 40.2  | 29.3              | 16.3  | 42.4       | 42.4  | 1.0                 | 1.1   | --     | --   | 100.0 | 100.0 | 198    | 92   |
| Illinois -----        | 92.7         | 80.6  | --                | 2.8   | 7.3        | 16.7  | --                  | --    | --     | --   | 100.0 | 100.0 | 55     | 36   |
| Indiana -----         | 86.4         | 80.0  | 4.5               | --    | 9.1        | 20.0  | --                  | --    | --     | --   | 100.0 | 100.0 | 22     | 10   |
| Ohio -----            | 63.6         | --    | --                | --    | 36.4       | --    | --                  | --    | --     | --   | 100.0 | --    | 11     | --   |
| Missouri -----        | 93.4         | 79.4  | 2.4               | 10.9  | 3.5        | 7.7   | 0.7                 | 1.9   | --     | --   | 100.0 | 99.9  | 286    | 311  |
| Kentucky -----        | 100.0        | --    | --                | --    | --         | --    | --                  | --    | --     | --   | 100.0 | --    | 3      | --   |
| Arkansas -----        | --           | --    | --                | --    | --         | --    | --                  | --    | --     | --   | 100.0 | 100.0 | 2      | 1    |
| Tennessee -----       | 100.0        | 100.0 | --                | --    | --         | --    | --                  | --    | --     | --   | 100.0 | 100.0 | --     | --   |

TABLE D-25. --Species composition of geese in the goose kill indicated by the goose-tail collection survey during the 1962-63 and 1963-64 hunting seasons (continued)

| State                        | Canada<br>geese |       | Lesser<br>snow<br>goose |       | Blue<br>goose |       | White-<br>fronted<br>goose |      | Brants |       | Total |       | Sample |      |  |
|------------------------------|-----------------|-------|-------------------------|-------|---------------|-------|----------------------------|------|--------|-------|-------|-------|--------|------|--|
|                              | 1962            | 1963  | 1962                    | 1963  | 1962          | 1963  | 1962                       | 1963 | 1962   | 1963  | 1962  | 1963  | 1962   | 1963 |  |
| Mississippi Flyway: (cont'd) |                 |       |                         |       |               |       |                            |      |        |       |       |       |        |      |  |
| Louisiana -----              | --              | 1.0   | 2.9                     | 11.8  | 82.4          | 67.6  | 14.7                       | 19.6 | --     | --    | 100.0 | 100.0 | 34     | 102  |  |
| Mississippi -----            | --              | --    | --                      | 100.0 | --            | --    | --                         | --   | --     | --    | --    | 100.0 | --     | 1    |  |
| Alabama -----                | 100.0           | 100.0 | --                      | --    | --            | --    | --                         | --   | --     | --    | 100.0 | 100.0 | 2      | 67   |  |
| Flyway weighted -----        | 64.25           | 58.90 | 7.52                    | 10.55 | 25.39         | 26.23 | 2.83                       | 4.32 | --     | --    | 99.9  | 100.0 | --     | --   |  |
| Atlantic Flyway:             |                 |       |                         |       |               |       |                            |      |        |       |       |       |        |      |  |
| Maine -----                  | 100.0           | 100.0 | --                      | --    | --            | --    | --                         | --   | --     | --    | 100.0 | 100.0 | 2      | 2    |  |
| Vermont -----                | --              | 100.0 | --                      | --    | --            | --    | --                         | --   | --     | --    | --    | 100.0 | --     | 1    |  |
| New Hampshire -----          | 100.0           | 100.0 | --                      | --    | --            | --    | --                         | --   | --     | --    | 100.0 | 100.0 | 2      | 3    |  |
| Massachusetts -----          | 100.0           | 78.6  | --                      | --    | --            | --    | --                         | --   | --     | 21.4  | 100.0 | 100.0 | 22     | 14   |  |
| Connecticut -----            | 100.0           | 100.0 | --                      | --    | --            | --    | --                         | --   | --     | --    | 100.0 | 100.0 | 1      | 6    |  |
| Rhode Island -----           | --              | --    | --                      | --    | --            | --    | --                         | --   | --     | --    | --    | --    | --     | --   |  |
| New York -----               | 22.2            | 63.0  | --                      | --    | --            | --    | --                         | 77.8 | 37.0   | 100.0 | 100.0 | 27    | 73     |      |  |
| Pennsylvania -----           | 100.0           | 100.0 | --                      | --    | --            | --    | --                         | --   | --     | 100.0 | 100.0 | 34    | 20     |      |  |
| West Virginia -----          | --              | --    | --                      | --    | --            | --    | --                         | --   | --     | --    | --    | --    | --     | --   |  |
| New Jersey -----             | 3.9             | 5.1   | --                      | --    | --            | --    | --                         | 96.1 | 94.9   | 100.0 | 100.0 | 77    | 216    |      |  |
| Delaware -----               | 100.0           | 97.3  | --                      | --    | --            | --    | --                         | --   | 2.7    | 100.0 | 100.0 | 63    | 74     |      |  |
| Maryland -----               | 99.5            | 100.0 | --                      | --    | --            | --    | --                         | 0.5  | --     | 100.0 | 100.0 | 590   | 814    |      |  |
| Virginia -----               | 98.3            | 88.1  | --                      | --    | --            | --    | --                         | 1.7  | 11.9   | 100.0 | 100.0 | 116   | 118    |      |  |
| North Carolina -----         | 100.0           | 100.0 | --                      | --    | --            | --    | --                         | --   | --     | 100.0 | 100.0 | 111   | 296    |      |  |
| South Carolina -----         | 100.0           | --    | --                      | --    | --            | --    | --                         | --   | --     | 100.0 | --    | 1     | --     |      |  |
| Georgia -----                | --              | --    | --                      | --    | --            | --    | --                         | --   | --     | --    | --    | --    | --     |      |  |
| Florida -----                | 100.0           | --    | --                      | --    | --            | --    | --                         | --   | --     | 100.0 | --    | 5     | --     |      |  |
| Flyway weighted -----        | 75.57           | 76.78 | --                      | --    | --            | --    | --                         | --   | 24.43  | 23.22 | 100.0 | 100.0 |        |      |  |

TABLE D-26. --Age ratios in the Canada goose kill based on the goose-tail collection survey during the 1962 and 1963 hunting seasons

| State                | Immatures per adult |      | Sample size |      |
|----------------------|---------------------|------|-------------|------|
|                      | 1962                | 1963 | 1962        | 1963 |
| Pacific Flyway:      |                     |      |             |      |
| Washington -----     | 0.58                | 0.55 | 225         | 342  |
| Oregon -----         | 0.44                | 0.50 | 95          | 333  |
| Idaho -----          | 0.17                | 0.55 | 56          | 161  |
| California -----     | 1.08                | 0.33 | 231         | 369  |
| Nevada -----         | --                  | 0.11 | 7           | 62   |
| Utah -----           | 0.33                | 0.33 | 52          | 61   |
| Central Flyway:      |                     |      |             |      |
| Montana -----        | 0.14                | 0.28 | 41          | 64   |
| North Dakota -----   | 0.86                | 2.13 | 138         | 119  |
| South Dakota -----   | 0.59                | 1.38 | 111         | 316  |
| Wyoming -----        | --                  | 0.28 | 26          | 95   |
| Nebraska -----       | 0.81                | 0.86 | 47          | 82   |
| Colorado -----       | 1.14                | 0.94 | 184         | 254  |
| Kansas -----         | 0.89                | --   | 36          | 9    |
| New Mexico -----     | --                  | 0.52 | 14          | 102  |
| Oklahoma -----       | 1.16                | 0.90 | 54          | 80   |
| Texas -----          | 0.56                | 1.03 | 261         | 118  |
| Mississippi Flyway:  |                     |      |             |      |
| Minnesota -----      | 0.92                | 2.25 | 73          | 65   |
| Wisconsin -----      | 0.67                | 0.81 | 167         | 472  |
| Michigan -----       | 0.81                | 0.46 | 78          | 41   |
| Iowa -----           | 0.69                | 1.18 | 54          | 37   |
| Illinois -----       | 1.94                | --   | 50          | 29   |
| Missouri -----       | 1.04                | 1.71 | 259         | 247  |
| Alabama -----        | --                  | 0.91 | 2           | 67   |
| Atlantic Flyway:     |                     |      |             |      |
| New York -----       | --                  | 2.83 | 6           | 46   |
| Pennsylvania -----   | 1.00                | --   | 34          | 20   |
| Delaware -----       | 1.10                | 1.25 | 63          | 72   |
| Maryland -----       | 1.31                | 1.89 | 584         | 814  |
| Virginia -----       | 1.07                | 1.08 | 114         | 104  |
| North Carolina ----- | 1.23                | 1.27 | 105         | 293  |

TABLE D-27.--Age ratios of geese (other than Canadas) in the goose-tail collection survey,  
1962-63

| Species                    | Immatures per adult |      | Sample size |      |
|----------------------------|---------------------|------|-------------|------|
|                            | 1962                | 1963 | 1962        | 1963 |
| <b>Lesser snow goose</b>   |                     |      |             |      |
| Washington -----           | --                  | 2.27 | 21          | 36   |
| California -----           | 1.45                | 1.35 | 130         | 244  |
| Montana -----              | 0.93                | 0.49 | 31          | 61   |
| North Dakota -----         | 0.52                | 0.78 | 105         | 66   |
| South Dakota -----         | 0.76                | 0.97 | 248         | 301  |
| Kansas -----               | 0.68                | --   | 32          | 4    |
| Texas -----                | 0.83                | 1.15 | 179         | 183  |
| Minnesota -----            | 0.55                | 0.90 | 45          | 38   |
| Iowa -----                 | 0.87                | --   | 58          | 15   |
| Missouri -----             | --                  | 5.80 | 7           | 34   |
| <b>Blue goose</b>          |                     |      |             |      |
| North Dakota -----         | 0.80                | --   | 36          | 15   |
| South Dakota -----         | 0.84                | 0.79 | 142         | 177  |
| Texas -----                | 0.55                | 0.68 | 51          | 69   |
| Minnesota -----            | 0.55                | 0.58 | 48          | 57   |
| Wisconsin -----            | --                  | 1.18 | 6           | 37   |
| Iowa -----                 | 0.83                | 0.56 | 84          | 39   |
| Louisiana -----            | 0.65                | 0.64 | 28          | 69   |
| <b>White-fronted goose</b> |                     |      |             |      |
| Oregon -----               | --                  | 5.08 | 5           | 73   |
| California -----           | 1.95                | 1.17 | 224         | 241  |
| North Dakota -----         | --                  | 2.00 | 4           | 39   |
| Texas -----                | 0.84                | 0.80 | 134         | 63   |
| <b>Brant</b>               |                     |      |             |      |
| California -----           | 0.60                | 0.23 | 40          | 37   |
| New Jersey -----           | 0.48                | 0.78 | 74          | 205  |



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